TECHNOLOGY DEPARTMENT

FEBRUARY 1950

Paper Industry

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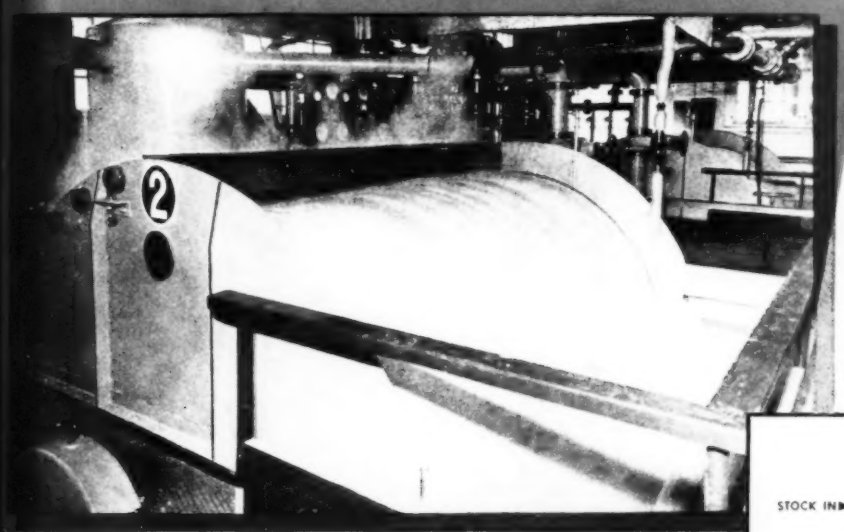
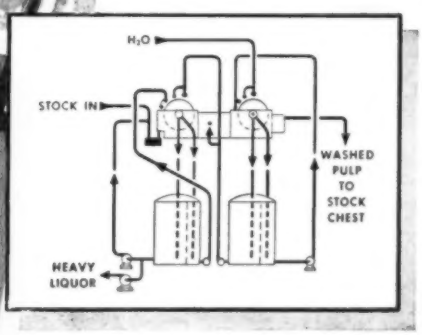


1
LESS WASH WATER
2
CLEANER PULP
3
A CLOSED SYSTEM



Flow sheet for a 2-drum 4-stage sulfite pulp washing installation.

WASHES SULFITE PULP

The advantages of the Swenson-Nyman pulp washing system, used so successfully for kraft and soda pulps, are now available to mills producing sulfite pulps. Well-washed pulp can now be obtained with a reduction in the quantity of wash water by utilizing the principle of two-stage washing on a single drum.

This results in higher total solids in the liquor to the alcohol plant, evaporator room, or other waste liquor process. Bulletin E-108 describes Swenson Equipment for Pulp Mills —send today for a copy.

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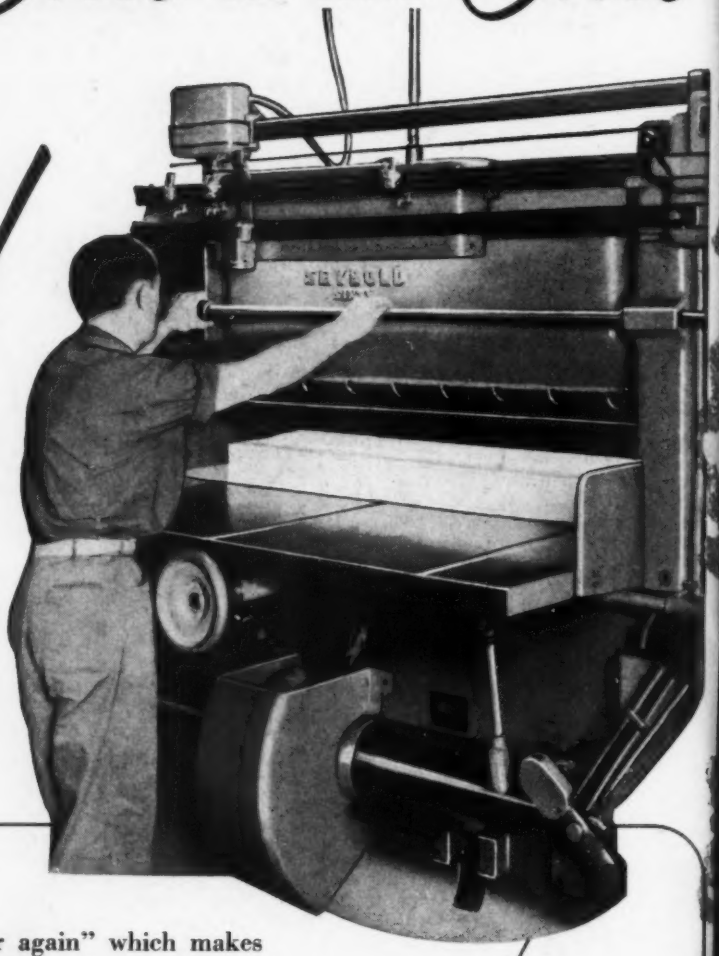

It's the constant "starting over again" which makes cutting operations costly . . . the tedious job of positioning the paper for one cut after another.

SEYBOLD has mechanized this tedious job—makes the cutter do the work, not the operator. Once set, the SPACER-TRIMMER starts its routine of cuts automatically, quickly, accurately. No combinations of settings too complicated or too numerous for this machine. Dozens of settings can be carried; each one precise and positive.

Hours of time, tons of spoiled sheets are saved by this SPACER-TRIMMER . . . the lowest cost equipment in your plant. Over its average life, it costs a dollar a day. Ask your SEYBOLD representative for details.

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—the exclusive method of putting the knife through the pile.

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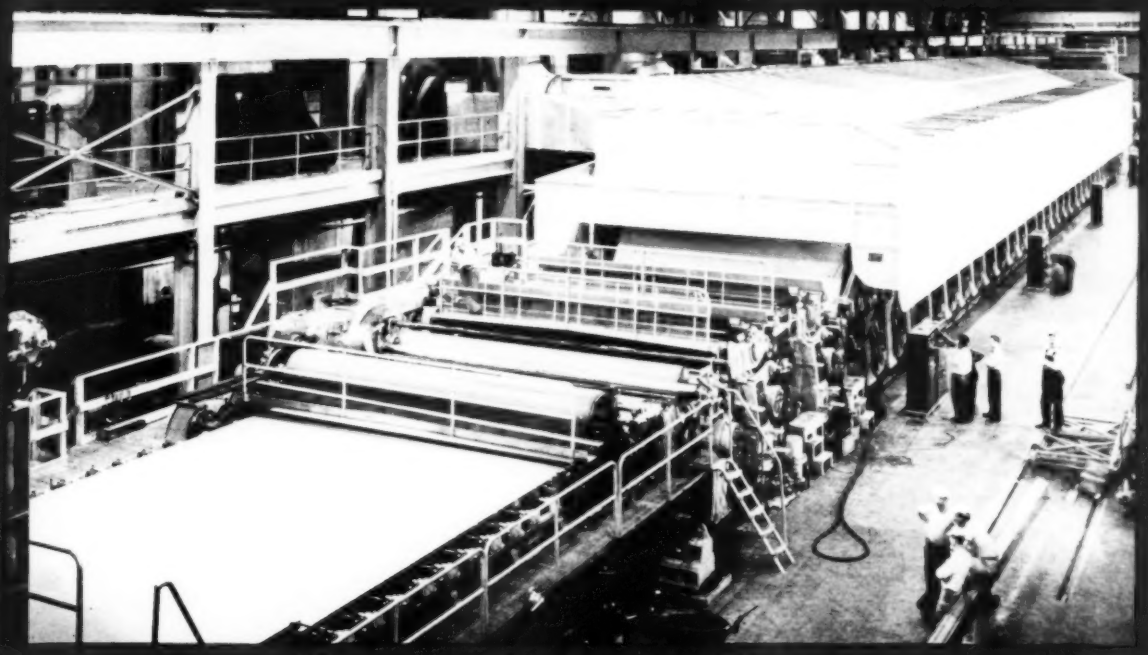
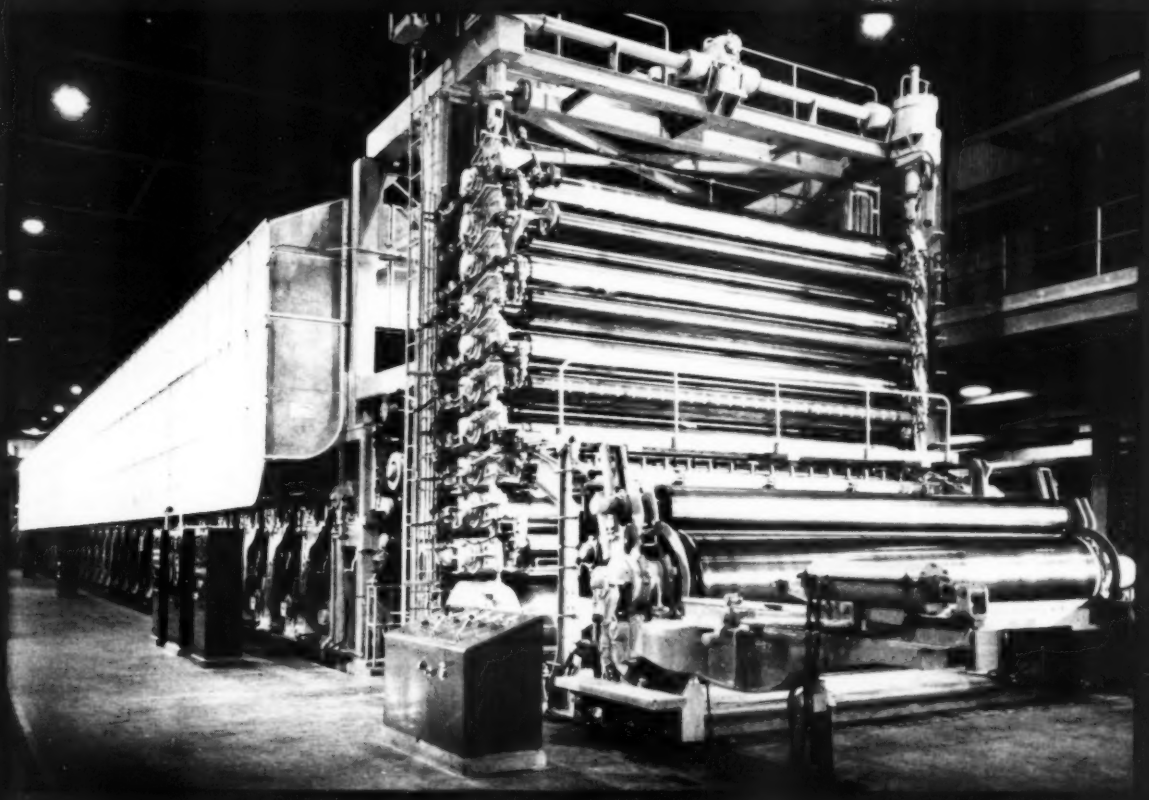


New...at Coosa River

Congratulations to Coosa River Newsprint Co. and to Kimberly-Clark Corp. for the expertly planned and executed operation at Childersburg, Ala. The recently completed No. 1 machine is shown here. The second 226" Beloit Newsprint Machine is nearing completion in this all-new plant.

BELOIT IRON WORKS, BELOIT, WISCONSIN



Increased Tonnage, Improved Quality and Reduced Cost per Ton of paper all result from the better, more rapid drainage of stock, properly refined by Sutherlands. All are "musts" for profitable mill operation today, but better quality results from stock properly prepared at a high drainage rate. More rapid drainage is provided by Sutherlands, plus additional refining output, without using any more power or floor space than you are now using. Give a few moments' thought to what all this can mean in your mill, then ask for our recommendations.

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The Paper Industry

Technology • Engineering • Management • Production

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THE PAPER INDUSTRY is indexed regularly in **Engineering Index** and **Industrial Arts Index.** An index to each volume is issued annually by the publisher as Section Two of the April number.

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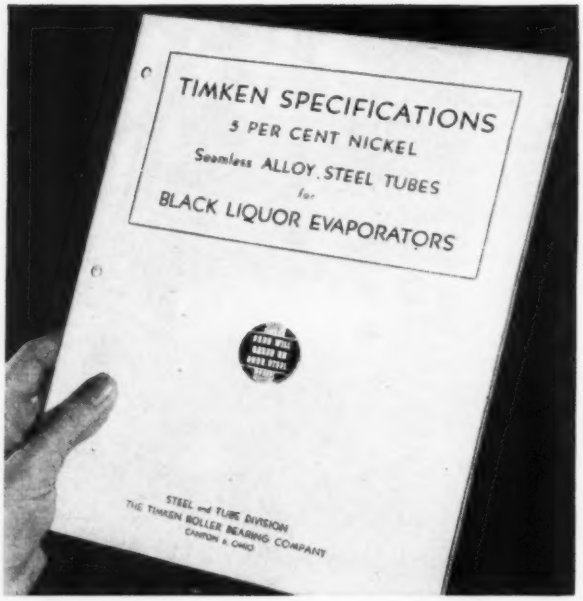

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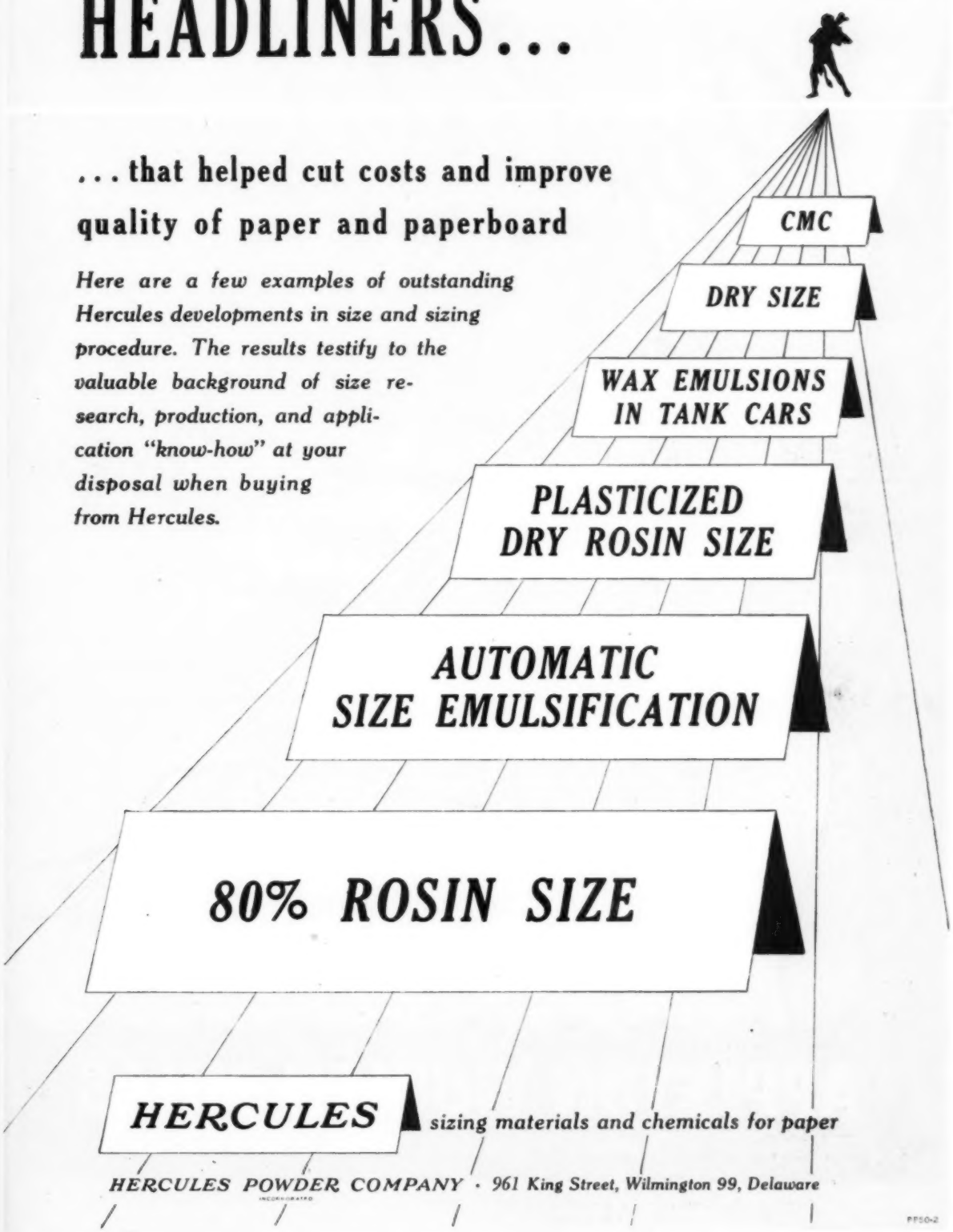

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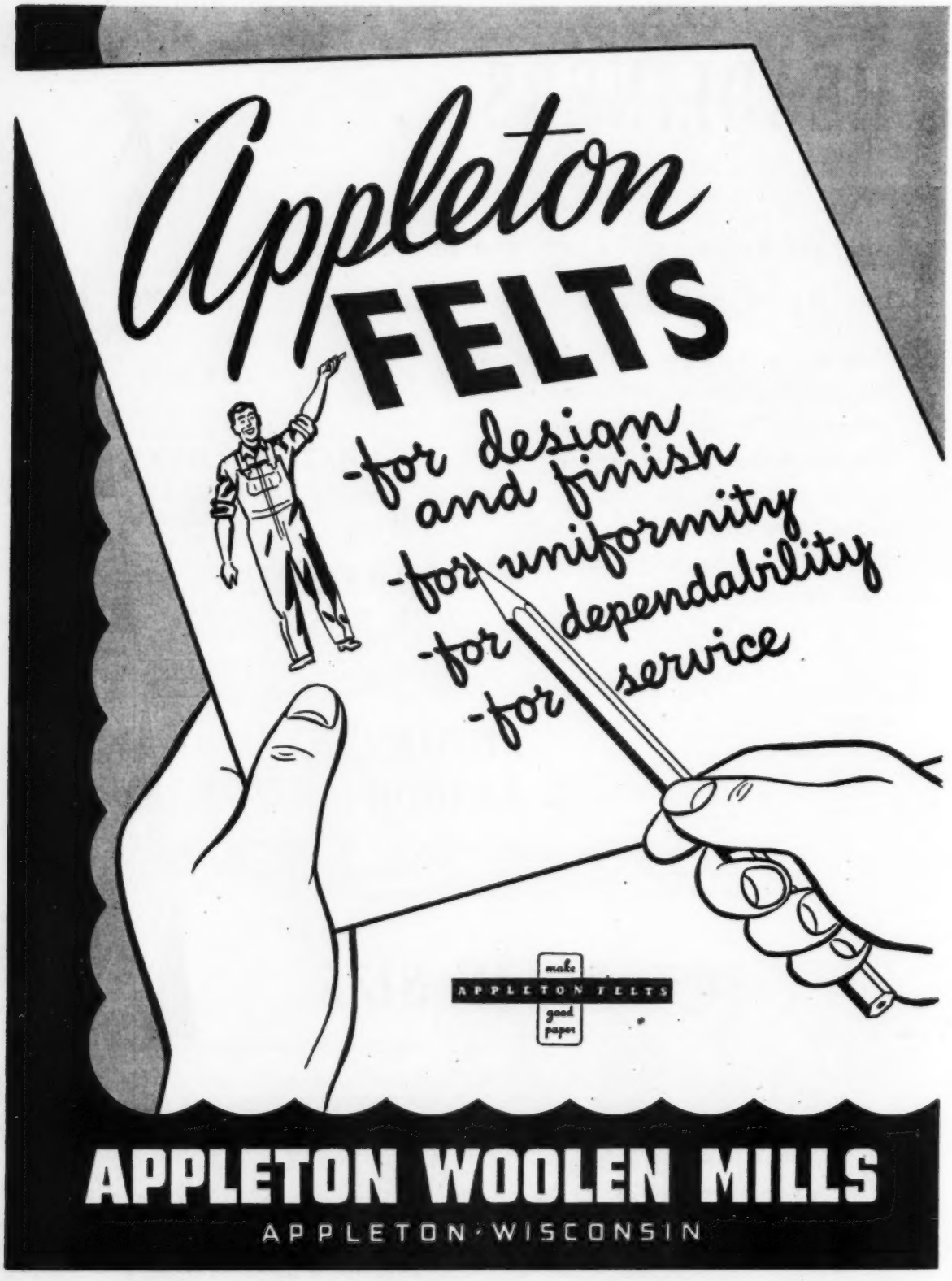
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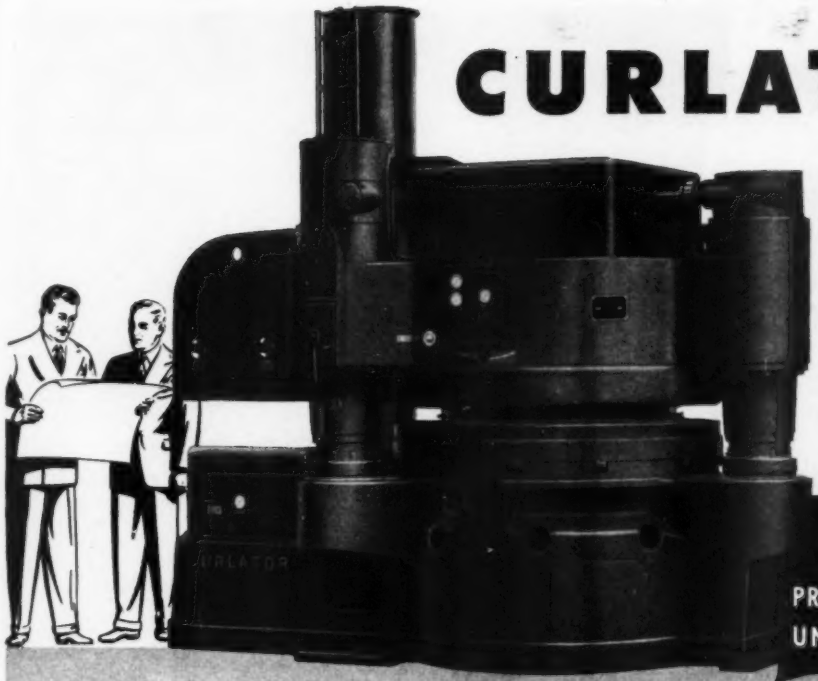
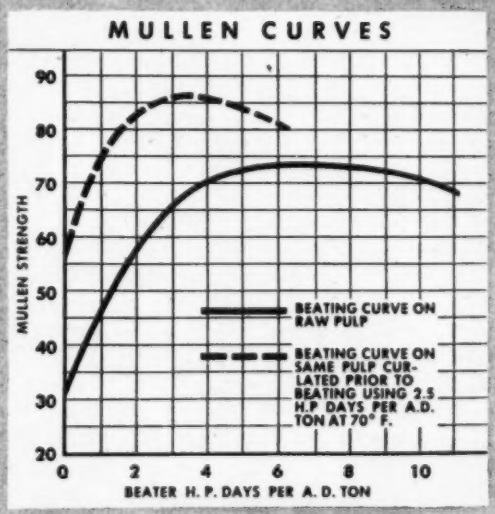
CURLATION*

New Process for Pulp Treatment



Effect of Curlation Prior to Beating, on the Beatibility of PREVIOUSLY DRIED NORTHERN UNBLEACHED SULPHITE PULP



TEST DATA

	HP/DT*	FREENESS	MULLEN	TEAR	DENSO-METER
RAW PULP	0	843	32.4	127	4.2
	1	822	46.2	133	9
	2	813	55.0	114	14
	3	792	66.6	98	23
	5	723	71.8	87	68
	7	628	72.5	75	161
	9	548	73.6	71	454
	10	492	68.2	64	744
	11	413	69.7	64	1808
	14	240	63.5	54	4772
PREVIOUSLY CURLATED PULP	0	840	56.3	142	3.5
	1	805	74.5	116	15
	2	763	82.8	101	27
	3	690	86.0	97	106
	4	608	85.8	83	184
	5	562	80.8	74	544
	7	430	78.3	72	1612
	12	187	65.3	49	2880

*H. P. DAYS PER A. D. TON SPENT IN BEATING ONLY.

The Curlator is a tool for altering the properties of pulp and paper to obtain qualities hitherto unachievable by mechanical means. The effects of curlation vary with the raw material and may be described only in relation to a particular pulp.

NOTE: Description of the testing procedures employed by the Curlator Corporation Laboratory will be provided upon request.

• Illustrated here is the CURLATOR*—the machine that permanently curls and twists pulp fibres to produce improved sheet characteristics.

CURLATION is a fully tested and thoroughly proved mechanical process.

Its accomplishments in improved quality and outstanding savings justify the attention of paper mill executives responsible for sales and profits.

The chart shown here will be followed by others equally informative. Meanwhile, illustrated literature is yours for the asking.

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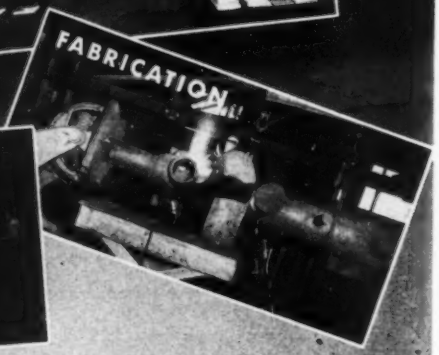

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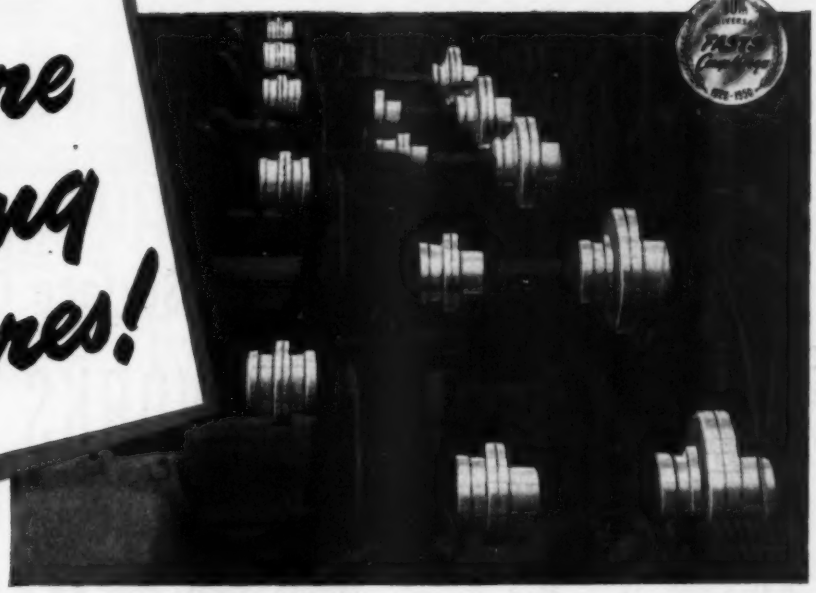

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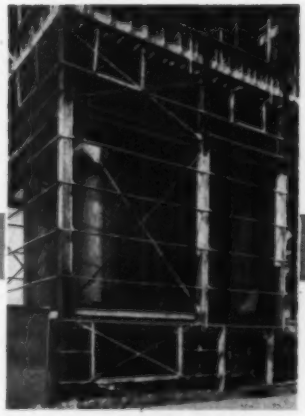

Installation view of four 11-ft. diam. by 33-ft. 8-in. digesters at a kraft pulp mill. The bottoms of these digesters were lined with stainless steel.

If so, let us quote on solid stainless, stainless-clad or stainless-lined equipment fabricated to meet your specific requirements

When it's stainless tanks or pressure vessels you want, pick your fabricator as carefully as you pick the type of steel. This is what we offer you—years of experience fabricating various types of stainless—welders and technicians who know how to overcome the problems encountered in the use of this metal—five plants located to give prompt service anywhere in the nation. We offer the same skill and service for the fabrication of such non-ferrous alloys as monel, nickel, and aluminum. Write the nearest office for full information or a quotation.

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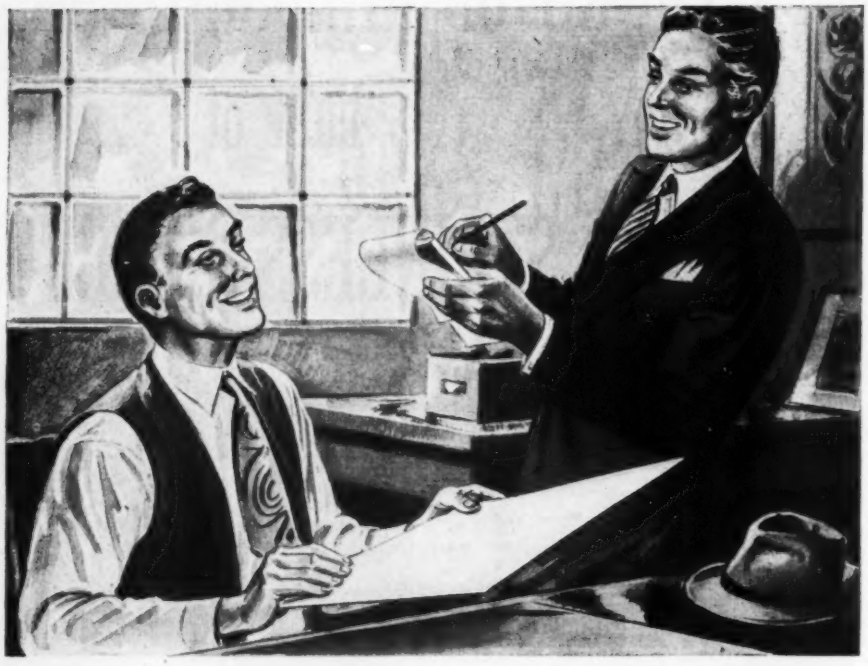

BUYER: Which is the printing side?

MILL MAN: Top side, of course.

BUYER: Which is top side? I don't see much difference.

MILL MAN: There isn't much difference. We use Hamilton Felts both top and bottom and put a smooth finish on *both* sides.

BUYER: This is the board I'm looking for. It will keep our inks from offsetting in the high-speed printing and folding machines.

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NEWS

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CORPORATION

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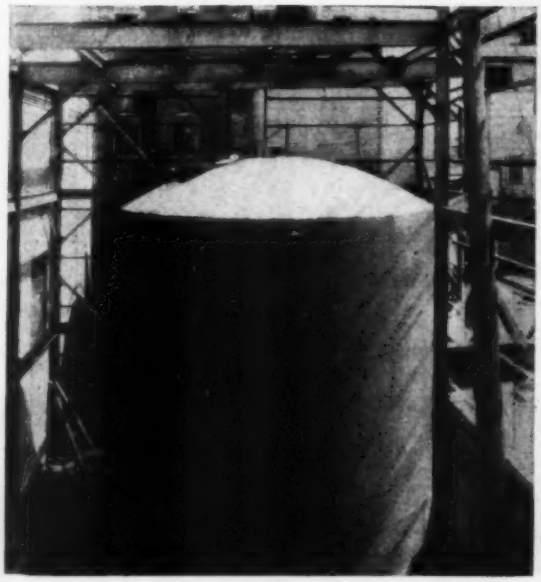
International Division: Milwaukee 1

FROM MIDGETS TO GIANTS range the size of pressure vessels and welded structures manufactured in A. O. Smith Vessel plants. To the left is part of an order for 2 ft. dia. x 80 ft. long storage tanks. Below are four huge lined coke drums, 16 ft. dia. by 91 ft., being manufactured simultaneously.

FORERUNNER OF THE FUTURE—Alloy-lined steel acid-storage tanks, like the one shown below, manufactured by A. O. Smith for the paper industry, are replacing existing wooden tanks, which have a limited life. A. O. Smith manufactured the first alloy-lined steel acid-storage tank ever made.

A. O. SMITH IS A LEADER in manufacturing plain carbon steel and corrosion-resistant pressure vessels. This A. O. Smith Vacuum Column, partially lined with type 405 stainless steel, combines extensive knowledge of both types of manufacture.



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Milwaukee 1, Wisconsin

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- ☐ V-44: Field Assembly of Pressure Vessels
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The ABC's of Powell Valve PERFORMANCE

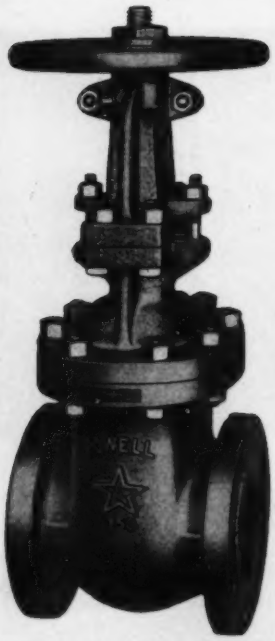

Fig. 1503—Class 150-pound Cast Steel Gate Valve with flanged ends, outside screw rising stem, bolted flanged yoke, tapered solid wedge.

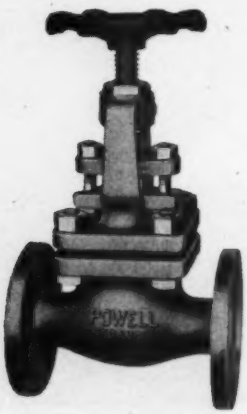

Fig. 1969—150-pound Stainless Steel Gate Valve with flanged ends, outside screw rising stem, bolted flanged yoke-bonnet and tapered solid wedge. 4-bolted, flanged bonnet Globe Valves in this design are also available.

Always the right valve. And, because Powell *can* always furnish the *right* valve, you can avoid failures that result from trying to make a valve "do" in a service to which it is not *specifically* adapted, as well as those caused by misapplication.

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Ask your nearest Distributor—or write direct

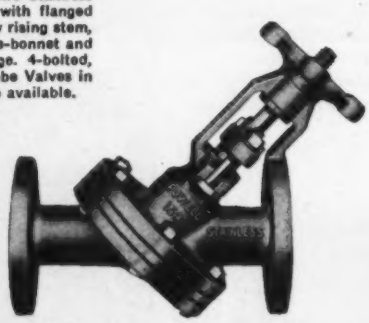


Fig. 1097—150-pound Stainless Steel Separable Body, Reversible Seat "Y" Valve. Lower half of body can be unbolted and turned through arc of 180 degrees to make 90-degree Angle Valve.

Fig. 2433—150-pound Stainless Steel Swing Check Valve with flanged ends and bolted flanged cap.

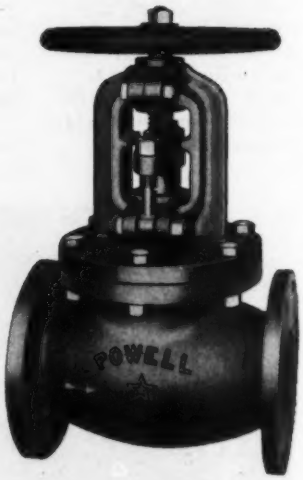
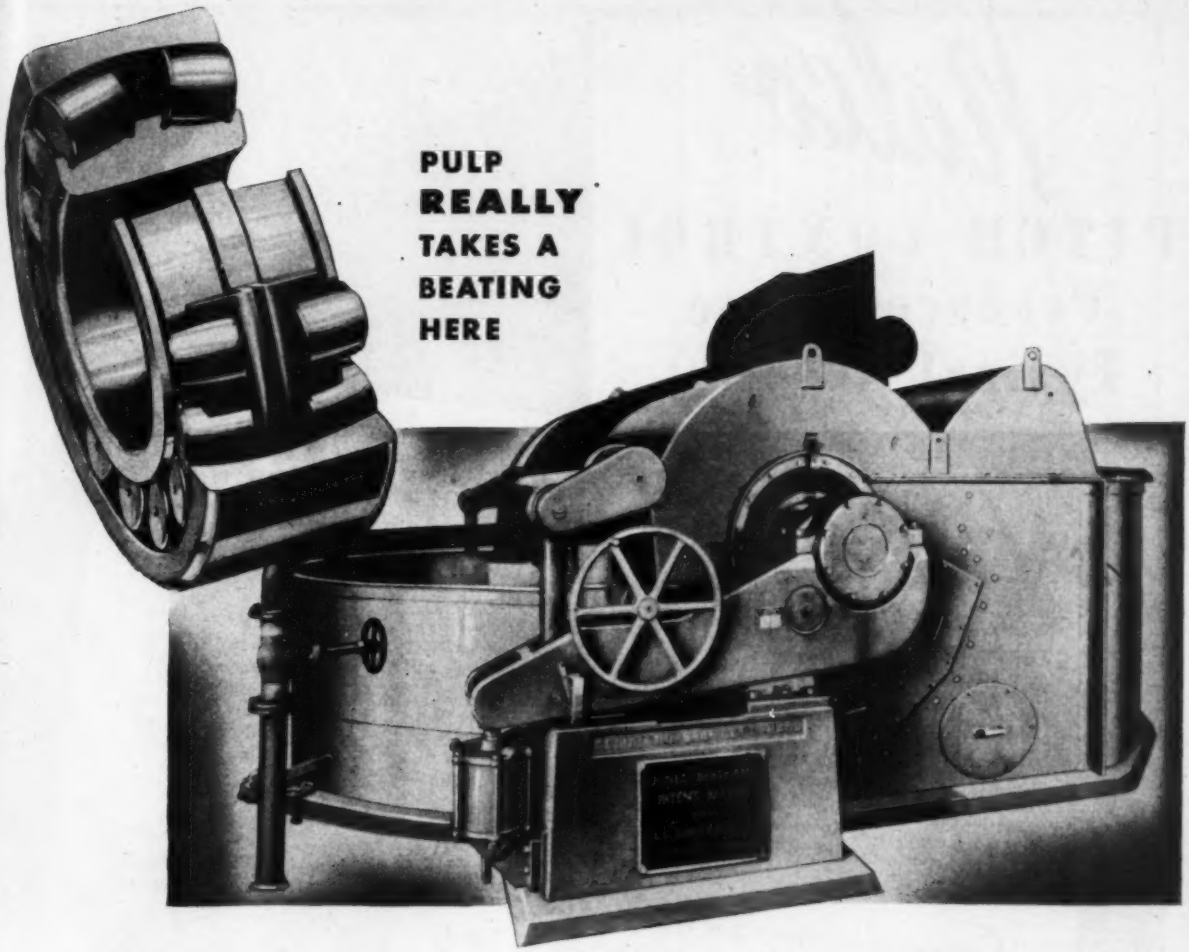


Fig. 2429—150-pound Stainless Steel Globe Valve with flanged ends, bolted flanged yoke and outside screw stem.

The Wm. Powell Company
Cincinnati 22, Ohio
DISTRIBUTORS AND STOCKS IN ALL PRINCIPAL CITIES

POWELL VALVES



Jones-Bertrams Patent Beater Refines Pulp Uniformly With SKF-Mounted Beater Roll

The Jones-Bertrams Patent Beater, made by the E. D. Jones & Sons Company, is specially designed to bring users five big plus factors: 1) savings up to 60% in H. P.; 2) uniformly refined pulp; 3) space saving; 4) low maintenance; 5) automatic control.

The improved roll is a one piece iron drum casting, mounted on a forged steel spindle carried on SKF Spherical Roller Bearings. SKF was selected because of high load capacity, radial rigidity and absence of any appreciable wear.

In addition, SKF Bearing design permits close setting between beater roll and bed plate. SKF Ball and Roller Bearings are contributing to the efficient operation of machines in every phase of the paper industry. Right below you'll find 8 reasons for considering putting them to work for you. SKF Industries, Inc., Philadelphia 32, Pa.

7055

SKF
BALL AND ROLLER BEARINGS

8 REASONS WHY SKF IS PREFERRED BY ALL INDUSTRY

INTEGRITY — CRAFTSMANSHIP — METALLURGY — TOLERANCE CONTROL

SURFACE FINISH — PRODUCT UNIFORMITY — ENGINEERING SERVICE — FIELD SERVICE

Pioneers of the Deep Groove Ball Bearing—Spherical Roller Bearing—Self-Aligning Ball Bearing

Nalco

PITCH CONTROL Produces These Typical Results:

"PAPER MACHINES IN FINE CONDITION"

From a Nalco Engineer's report on The Nalco System of Pitch Control in a mill producing fine papers:

"Beater Room Superintendent reported that paper machines were in very fine condition when examined during shutdown period over the weekend. Trays were reported in very good condition and much better than formerly noted. No sticking on press rolls. Oliver filter reported in good condition, no plugging. The Savalla Saveall reported in very good condition."

NALCO ELIMINATED PITCH AND POPLAR WAX

In a mill manufacturing semi-chemical pulp, another Nalco Engineer reports:

"This company ran into considerable trouble recently from pitch and poplar wax in their semi-chemical corrugated medium. These waxes caused filling of wires and sticking of press rolls which in turn caused up to 30 breaks in a day. Nalco Pitch Control was applied at the fan pump and eliminated their trouble."

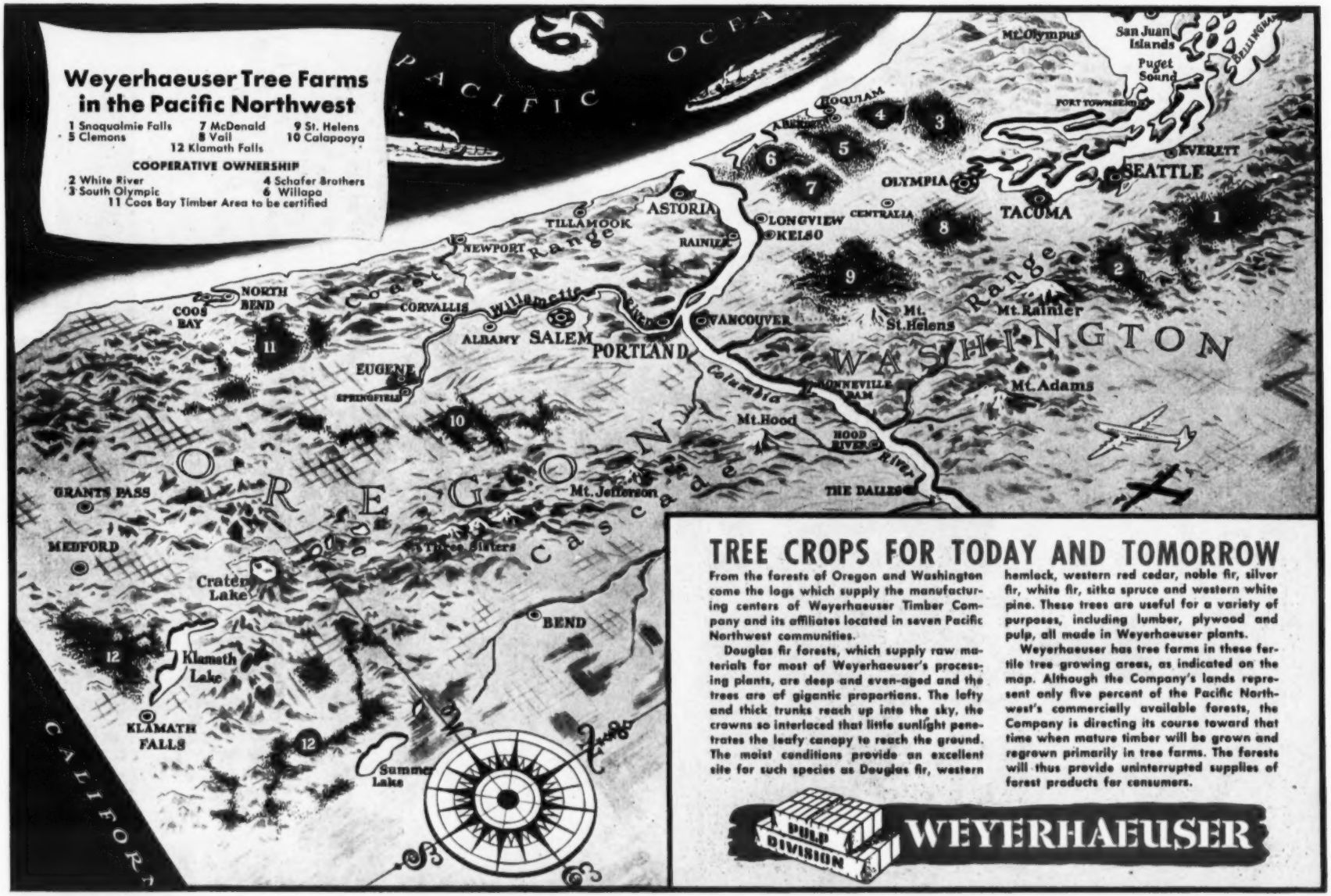
THE examples above are typical of the success and versatility of The Nalco System of Pitch Control in paper and pulp mills. Pitch-free operation saves time and money in these mills, and helps to produce a better product.

If you have pitch control problems, write Nalco for full data on the efficient, economical Nalco System as it may apply to your mill.

Nalco
BALL
FEEDER
Nalco Ball Feeders utilize Nalco Ball Briquet chemicals weighing one pound each to provide simple, virtually foolproof control of feeding. Where mills have facilities for pulverized or liquid feeding of chemicals Nalco can also provide them.

NATIONAL ALUMINATE CORPORATION
6232 W. 66th Place • Chicago 38, Illinois
Canadian inquiries should be addressed to Alchem, Limited, Burlington, Ontario, Canada

THE SYSTEM • Serving the Paper Industry through Practical Applied Science



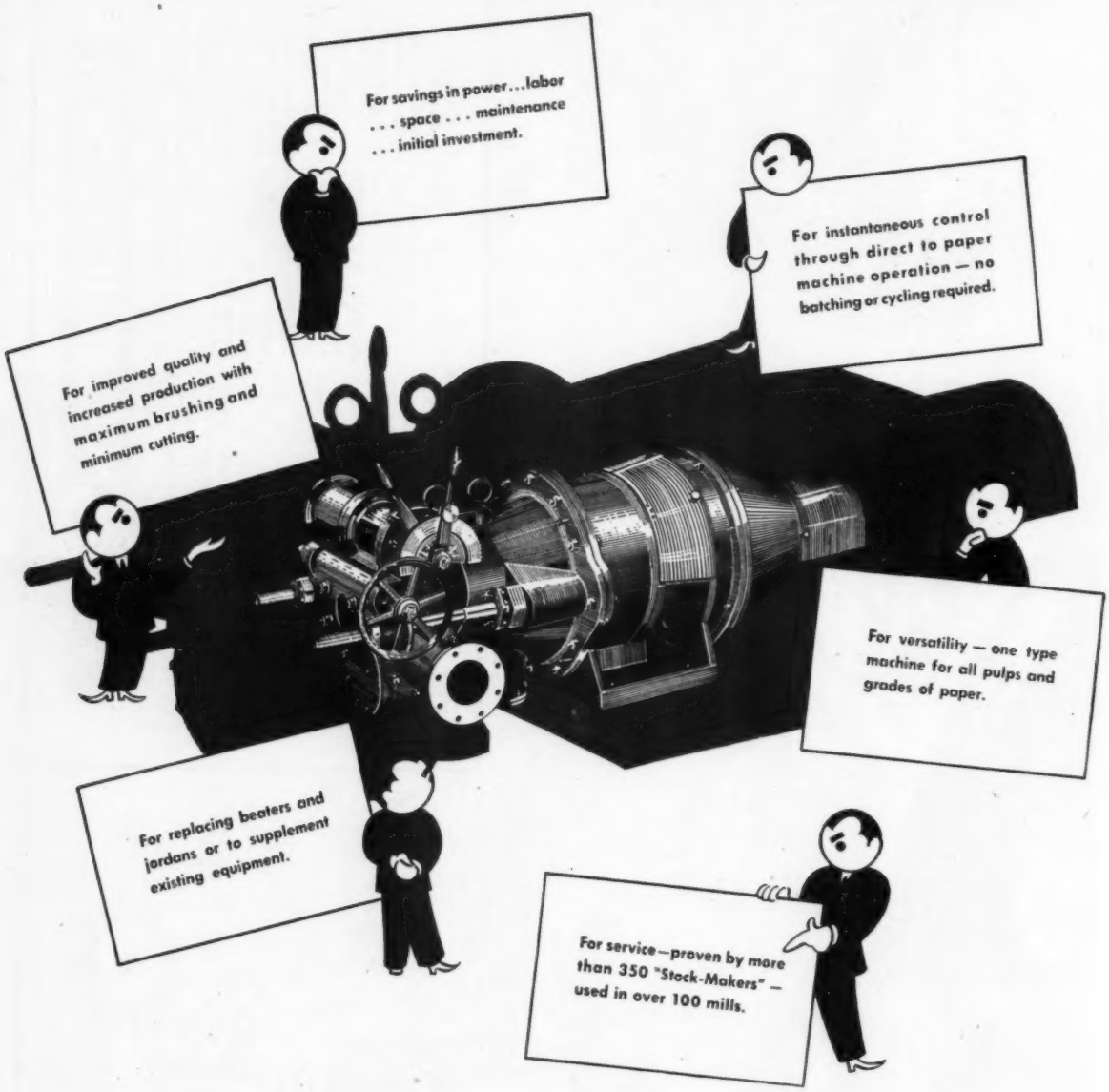
TREE CROPS FOR TODAY AND TOMORROW

From the forests of Oregon and Washington come the logs which supply the manufacturing centers of Weyerhaeuser Timber Company and its affiliates located in seven Pacific Northwest communities.

Douglas fir forests, which supply raw materials for most of Weyerhaeuser's processing plants, are deep and even-aged and the trees are of gigantic proportions. The lofty and thick trunks reach up into the sky, the crowns so interlaced that little sunlight penetrates the leafy canopy to reach the ground. The moist conditions provide an excellent site for such species as Douglas fir, western hemlock, western red cedar, noble fir, silver fir, white fir, sitka spruce and western white pine. These trees are useful for a variety of purposes, including lumber, plywood and pulp, all made in Weyerhaeuser plants.

Weyerhaeuser has tree farms in these fertile tree growing areas, as indicated on the map. Although the Company's lands represent only five percent of the Pacific Northwest's commercially available forests, the Company is directing its course toward that time when mature timber will be grown and regrown primarily in tree farms. The forests will thus provide uninterrupted supplies of forest products for consumers.

WEYERHAEUSER


For savings in power... labor ... space ... maintenance ... initial investment.
For instantaneous control through direct to paper machine operation — no batching or cycling required.
For improved quality and increased production with maximum brushing and minimum cutting.
For versatility — one type machine for all pulps and grades of paper.
For replacing beaters and jordans or to supplement existing equipment.
For service—proven by more than 350 "Stock-Makers" — used in over 100 mills.

Any way you look at it!

The Morden "Stock-Maker" is superior for Beating and Refining

FOR SPECIFIC INFORMATION CONTACT

MORDEN MACHINES COMPANY

PACIFIC BUILDING — PORTLAND 4, OREGON

in Canada
The William Kennedy & Sons, Ltd., Owen Sound, Ontario

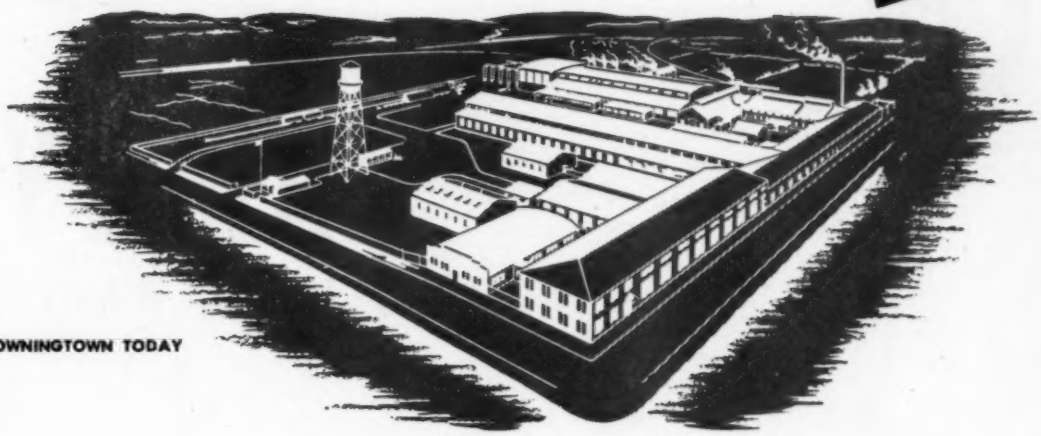
in England
Millspaugh, Limited, Sheffield

EARLY VIEW OF DOWNINGTOWN PLANT

1880

1950

THREE SCORE AND TEN



DOWNINGTOWN TODAY

The year 1950 is more than just mid-century for Downingtown. It marks 70 years of engineering, developing and manufacturing of paper making machinery to produce the quality sheet demanded by customers at a profitable operating speed. Down through these 70 years, Downingtown has always had a new and better paper machine or accessory ready for an ever progressing paper industry. THIS YEAR WILL BE BIGGER THAN EVER. Watch for announcements of the new "70th Anniversary" products developed and perfected to produce better paper and board at reduced costs to you. Experience during "Three Score and Ten" years of solving paper making problems assures you that these new Downingtown "firsts" are just what you've been waiting for.

DOWNINGTOWN MANUFACTURING COMPANY

DOWNINGTOWN, PA.

DESIGNERS AND BUILDERS OF PAPER MAKING MACHINERY SINCE 1880

SAVE LABOR
SAVE DOLLARS

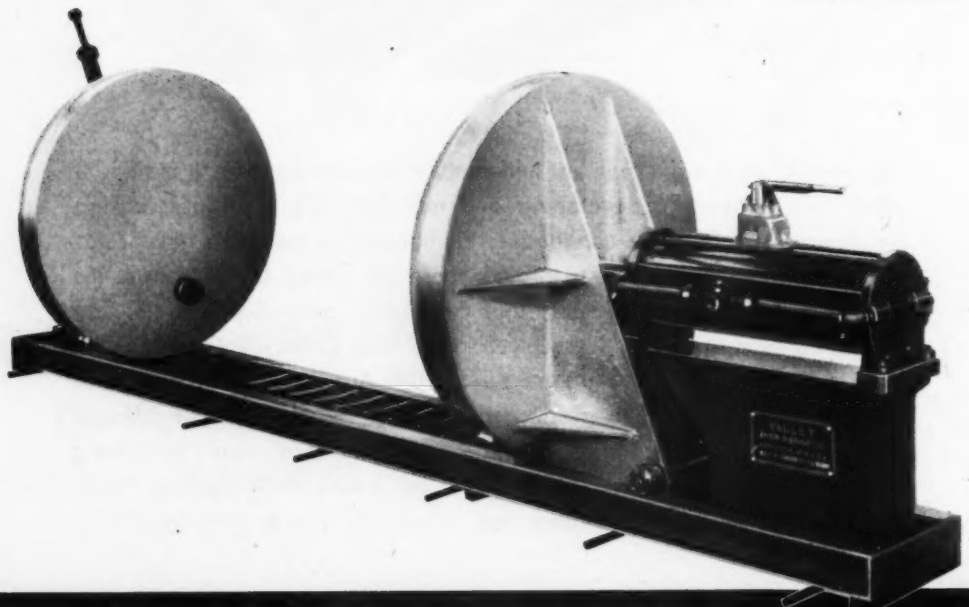
in the Wrapping of Your Jumbo Rolls

For Rolls 36″ to 40″ Diameter
and up to 72″ Long.

Can also be provided for Scale Mounting, for Greater Convenience in Wrapping and Weighing.

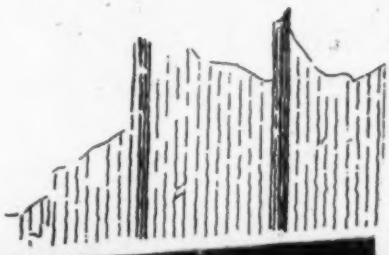
Write for Detailed Information.

VALLEY
ROLL END PASTER

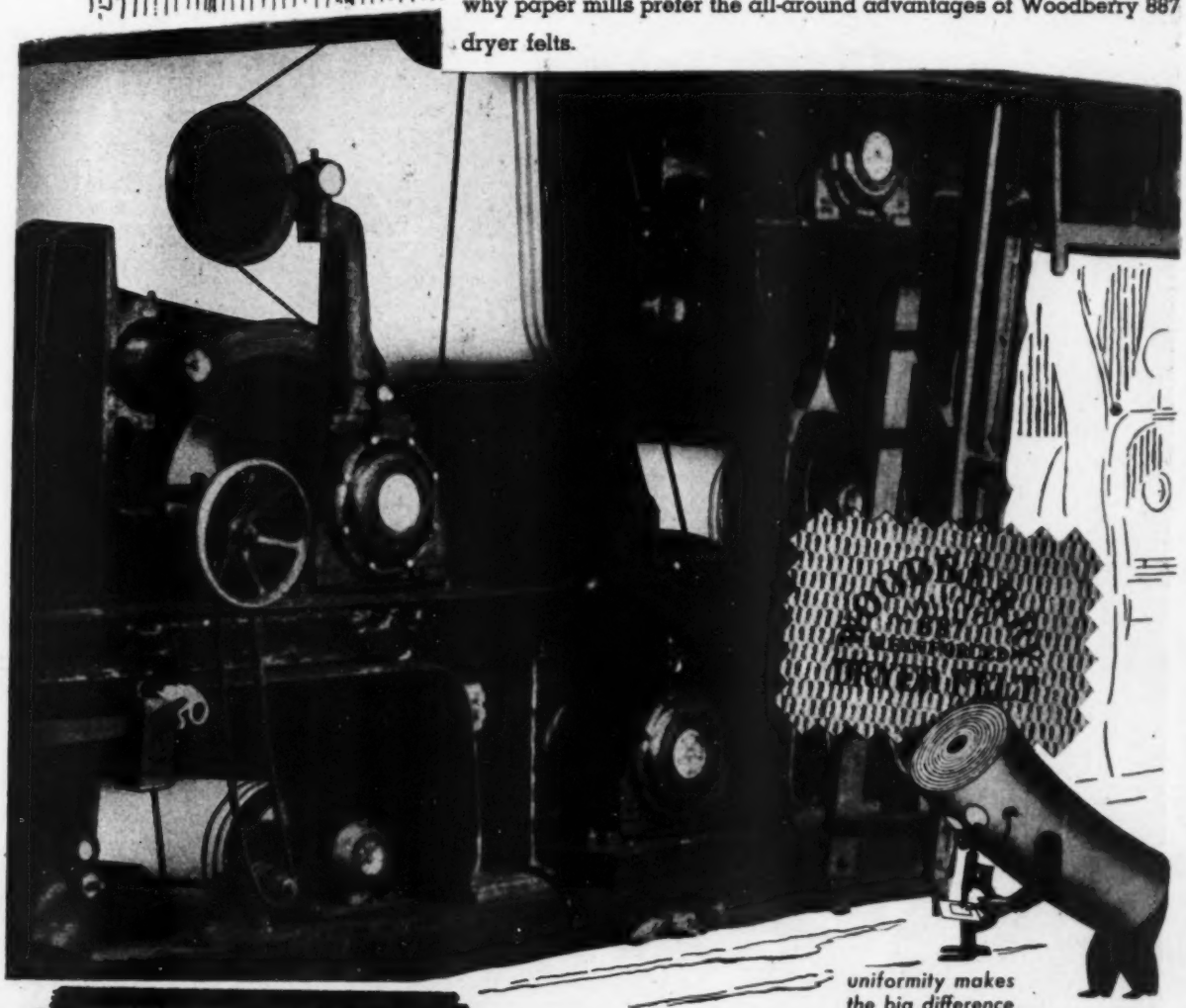


VALLEY IRON WORKS COMPANY
APPLETON, WISCONSIN

Savings are Higher With This Better Dryer Felt



There are extra savings for you in Woodberry 887's patented feature—asbestos yarns woven at scientifically determined intervals into the face of these heavy duty dryer felts. Add this to the extra savings in the lowered steam consumption that results from Woodberry's high degree of porosity—check the finer qualities of paper you get with Woodberry's highly uniform contact surfaces—and see why paper mills prefer the all-around advantages of Woodberry 887 dryer felts.



uniformity makes the big difference

TURNER HALSEY
COMPANY
Selling Agents
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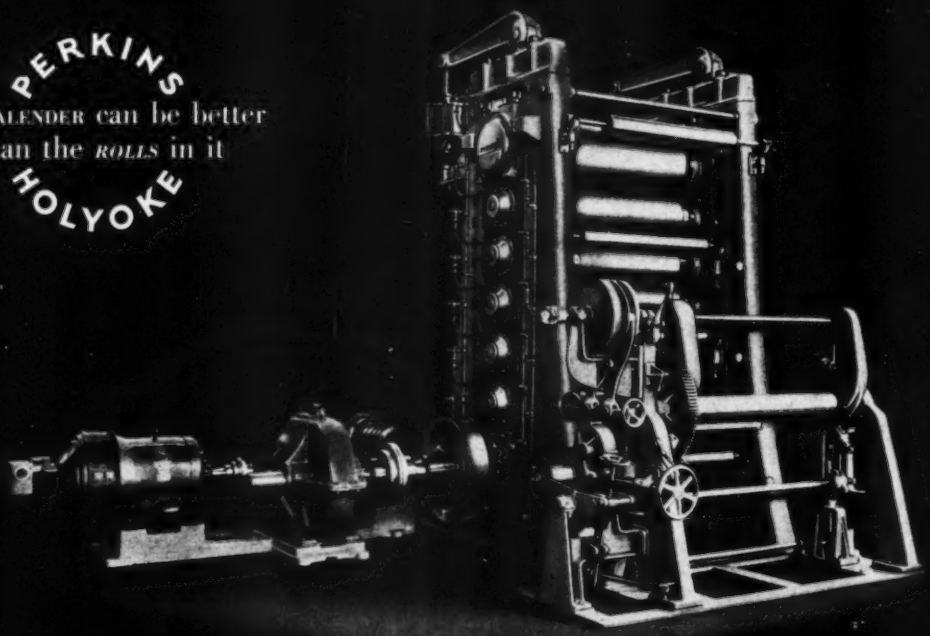
Mt. Vernon-Woodberry Mills

Branch Offices: CHICAGO • ATLANTA • BALTIMORE • BOSTON • LOS ANGELES • AKRON

PERKINS
No CALENDER can be better
than the *ROLLS* in it
HOLYOKE

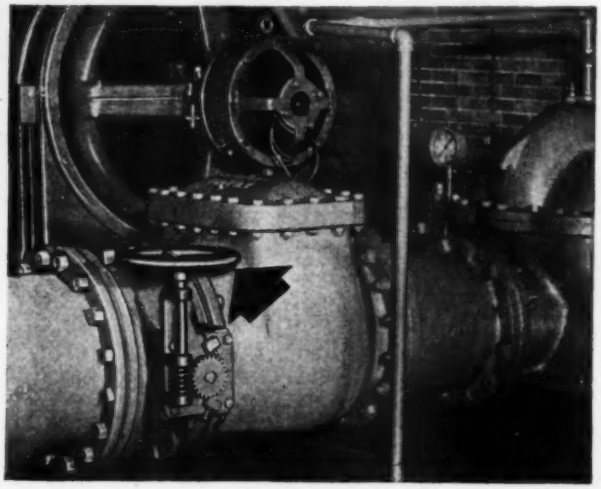


PERKINS

B. F. PERKINS & SON, Inc.
HOLYOKE, MASS., U.S.A.
LARGEST MANUFACTURERS OF CALENDER ROLLS IN THE WORLD

R-S valvEvents

• EXCERPTS FROM THE R-S BOOK OF EXPERIENCE •



6 HANDWHEEL TURNS OPEN OR CLOSE VALVE

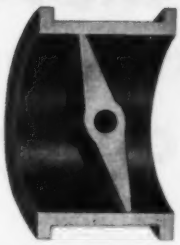
This quick closing feature is an important consideration in water pumping operations as illustrated above or any application where a battery of synchronous driven pumps discharges into a common header.

Normal procedure when starting a pump is to shut off the discharge valve until the pump has gained the desired speed. The valve is then opened gradually. Since it requires only a few seconds of an operator's time, this important operation is not likely to be neglected when R-S Valves are installed. Burned-out motors at start-ups can be practically eliminated.

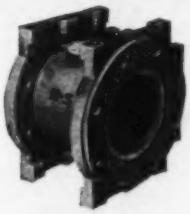
R-S Valves show substantial savings in pumping power due to low pressure drop. Consider also the compact design, light weight and self-cleaning features.

Consult with your local R-S representative. Look for the address and phone number listed under "R-S Products, Valves" or write direct.

R-S PRODUCTS CORPORATION
Wayne Junction • Philadelphia 44, Pa.



Sectional view shows beveled vane of R-S Valve firmly seated at a 12½° angle. A metal-to-metal seat gives satisfactory commercial shut-off in many cases. Manual or automatic control available.



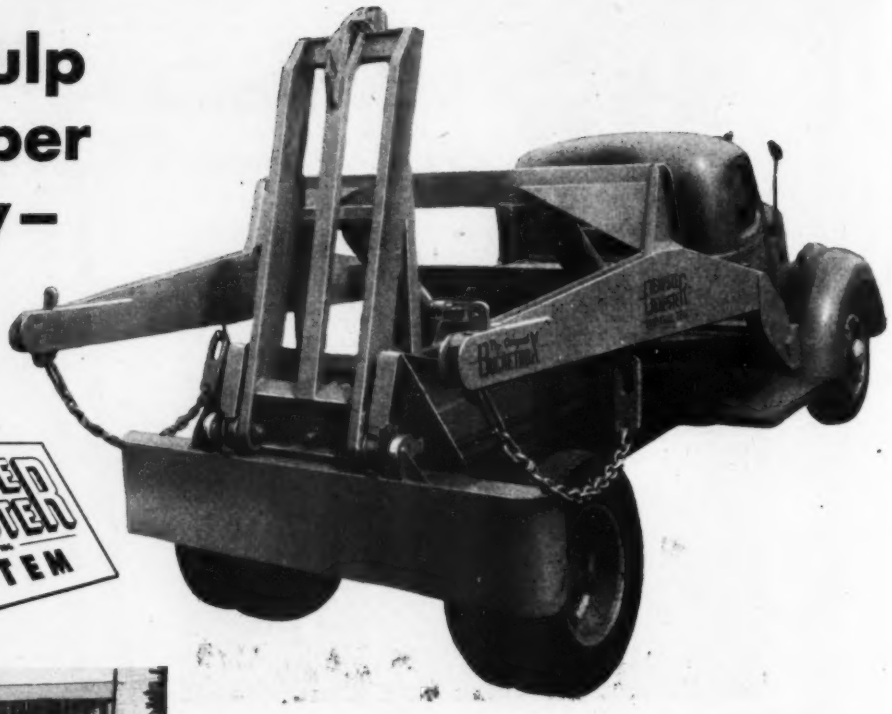
Drip tight or bubble tight closure can be obtained with a rubber seat. Under pressure, due to the 12½° angle of closure, the rubber yields both radially and longitudinally around the shaft-bosses and the periphery of the valve vane to insure positive shut-off.

No. 709 30-inch 50-pound valve equipped with rubber seat. Air bubble tight at 80 psig and drip tight with water at 100 psig. Fully enclosed gear reduction drive. Every R-S Valve is available in smaller and larger sizes, in all materials and for lower and higher pressures.

New!

Catalog No. 18 featuring R-S 50-pound valves is just off the press. Ask for it!

In the Pulp And Paper Industry—



DEMPSTER DUMPSTER TRADE MARK SYSTEM

46 Dempster-Dumpster Truck Hoisting Units Are Handling 849 Containers!

In dozens of pulp and paper plants throughout the United States, the Dempster-Dumpster System of materials handling is stepping-up production . . . increasing efficiency . . . and saving thousands of dollars annually! Today, less than 10 years after the first Dempster-Dumpster unit was installed in a paper plant, there are 46 Dempster-Dumpster Truck Hoisting Units handling 849 containers throughout the paper industry. These containers, in sizes up to 10 cu. yds., are handling all types of materials—liquids, trash and rubbish, raw materials or finished product. Only 13% of the plants served by the Dempster-Dumpster System have more than one hoisting unit. In one plant one truck hoisting unit serves 58 containers. In the simple Dempster-Dumpster System one truck hoisting unit and driver serve any required number of detachable steel containers. These containers are placed at convenient materials accumulation points outside and inside plants. The hoisting unit makes scheduled rounds, picking up each pre-loaded container, and hauls it to its destination. If materials are to be dumped, it is done automatically by hydraulic controls at driver's seat. It will pay you to investigate the Dempster-Dumpster System. Write now to Dempster Brothers, Inc. for literature and complete information.

Pictured at left is a standard drop bottom type container in three stages of operation—on the ground, in carrying position, and dumping.

DEMPSTER BROTHERS
720 Dempster Building Knoxville 17, Tennessee

BROWN SPECIALIZED INSTRUMENTATION IS KEEPING PACE WITH PAPER INDUSTRY MANUFACTURING TECHNIQUES!

HIGH QUALITY AND LOW COST FROM CHIP-BOARD TO BOND PAPER ... WITH THE BROWN *ElectroniK* SYSTEM

THE *ElectroniK* Potentiometer has set a record for outstanding performance in the Paper Industry . . . bringing to modern processing a whole new concept in precision and accuracy for the automatic control of vital variables.

And new records are in the making. *ElectroniK* Control Systems . . . with unmatched speed, high reproducibility and minimum maintenance . . . are setting the stage for new production standards, with higher quality and lower cost as a continuing goal.

Yes, from chip-board to bond paper, the *ElectroniK* Controller is hitting its stride . . . in the measurement and control of speeds, temperatures, pH, conductivity, moisture content and other variables. Call in your local Honeywell engineer for a discussion of its application to your processes . . . and ask about the Brown Training School where a complete instrument course is available to your men.

WORLD'S LARGEST ORGANIZATION FOR ADVANCED INSTRUMENTATION AND CONTROL — COMMERCIAL • RESIDENTIAL • INDUSTRIAL

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BROWN INSTRUMENTS DIVISION
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Offices in 73 principal cities of the United States, Canada and throughout the world

Specialized Instrumentation
FOR THE PAPER INDUSTRY

ANOTHER VANDERBILT PRODUCT

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NYTAL

New York State Talc
for the Paper Industry
—Uniform Quality—

R. T. VANDERBILT CO. INC.

230 Park Avenue, New York 17, N. Y.

The Paper Industry

February 1950

Must We Lose Our Trees?

NEARLY EVERY DAY we read of medical research pushing back the frontiers of science leading to greater life expectancy of mankind. Diseases and disorders are being tracked down and in many cases virtually eliminated or brought under control. But not so the diseases and insects that plague our forests and destroy the natural resource upon which our industry is based.

Many instances have come to the fore in recent years where ravages of insects and disease such as the spruce budworm and chestnut blight have caused tremendous losses of timber. From all reports these causes of forest destruction are increasing; furthermore, their unchecked progress becomes increasingly serious as our timber resources become more fully utilized. While efforts of the Forest Service as well as other government and institutional research organizations have been successful in many cases, very little has been done by the pulp and paper industry itself to aid in this effort of preserving its own raw material supply.

Where, then, have our efforts been directed? Great strides have been taken in wood utilization. Many species of wood thought to be useless from the standpoint of papermaking have come to be a more significant raw material than the few varieties that dominated as a wood pulp source some thirty years ago. Now, a wide variety of both hardwoods and softwoods are widely utilized in products of this industry.

Actual growing of trees or tree farming, as it has come to be known, has progressed rapidly. Many paper companies all over the country have carried on reforestation work and have promoted good forestry practices among farmers and woodlot owners. Various organizations, made up of pulp and paper as well as many other wood using industries, such as Trees for Tomorrow, Inc., have done much to arouse interest in the cause of good forestry as well as in the prevention of forest fires. While fire will always be a real menace, its spectacular nature keeps it in the forefront as an enemy of conservation. In contrast, the insidious nature of insect infestation and disease is far more formidable.

The extent of this type of depredation is pointed up by numerous examples. For instance, it has been estimated that a large proportion of the Engelmann spruce in Colorado and Wyoming has been destroyed by beetles which began their destruction following storm damage about ten years ago. More than three-fifths of all Colorado's standing timber is spruce, about one-third of which has been destroyed. All told, about 20 billion board feet of timber in Colorado and Wyoming is dead or dying because of this infestation. In this case, the beetle did not come to our attention until it had infested some three million healthy trees. The Bureau of Entomology and Plant Quarantine has been quoted as follows: "There appears to be no economical method of battling the spread of this infestation. The large number of trees in need of treatment makes control economically impossible."

In another quarter it has been estimated that about 100 million dollars worth of spruce and balsam trees are destroyed annually in Canada by the spruce budworm, which strips trees of their foliage and eats the buds. Other forest killers including rusts, cankers, borers and weevils are continually at their work in practically all of our forests.

Since this problem is of a broad nature it seems to be one that cannot be attacked in a practical manner by the average individual company. The Forest Service and the Department of Agriculture are already doing their utmost in promoting good forest management and in protecting our forests. However, a pattern has been set for handling projects of this kind.

CHEMICAL USERS' GUIDE To General Chemical Products for the Paper Industry

PRODUCT	AVAILABLE FORMS	COMMERCIAL STRENGTH (MIN.)	SHIPPING CONTAINERS	APPLICATIONS
Aluminum Sulfate $Al_2(SO_4)_3 \cdot 14H_2O$ approx. *(Alum)*	Commercial & Iron Free: Lump, Ground Powdered	17.25% Al_2O_3	Bags Bulk Carloads	Precipitation of rosin size and filler; water clarification; manufacture of satin white; pitch control; mordant for dyes.
Aluminum Sulfate $Al_2(SO_4)_3$ + water *(Liquid Alum)*	Liquid	32° Be (total Al_2O_3 7.2%)	Tank Trucks Tank Cars	Same as commercial dry product but lower strength.
Salt Cake Na_2SO_4 *(Sodium Sulfate)*	White or Grayish Granules	95-99% Na_2SO_4	Bags Bulk Carloads	Used in kraft cooking liquors as the source of Na_2S.
Glauber's Salt, Crystal $Na_2SO_4 \cdot 10H_2O$ *(Sodium Sulfate)*	Colorless Crystals	96% $Na_2SO_4 \cdot 10H_2O$ (42.3% Na_2SO_4)	Bags Barrels Fibre Drums	Substitute for salt cake in kraft cooking liquor.
Glauber's Salt, Anhydrous Na_2SO_4 *(Sodium Sulfate)*	White Granules	99.5% Na_2SO_4	Bags Bulk Carloads	Same as Crystal but stronger product.
Sulfuric Acid H_2SO_4	Liquid	66° (93.19%), 99% 20% oleum and higher strengths	Carboys Steel Drums Tank Trucks Tank Cars	Wire souring; parchmentizing; acid wash in last stage of multi-stage pulp bleaching; neutralizing tall oil soaps.
Sodium Thiosulfate $Na_2S_2O_3 \cdot 5H_2O$ *(Hypo)*	Colorless Crystals	99.75% $Na_2S_2O_3 \cdot 5H_2O$	Bags Fibre Drums	Anti-chlor.
Sodium Sulfite, Anhydrous Na_2SO_3 *("Sulfite")*	White Powder	98.5% Na_2SO_3	Bags Fibre Drums	Anti-chlor.
Sodium Silicate $Na_2O \cdot XSiO_2$ + water *(Water Glass)*	Liquid	38°, 41°, 42° Be; special and higher strengths	Steel Drums Tank Cars Tank Trucks	Adhesive for corrugated and solid fibre board; used in coating mixtures to reduce viscosity and in beater sizing to stiffen paper. Aid in bleaching & flocculation.
Chromium Potassium Sulfate $K_2SO_4 \cdot Cr_2(SO_4)_3 \cdot 24H_2O$ *(Potash Chrome Alum)*	Red Violet Crystals	99.5% $K_2SO_4 \cdot Cr_2(SO_4)_3 \cdot 24H_2O$	Fibre Drums	Used in "save-all" or white water systems.
Aqua Ammonia NH_4OH + water *(Ammonia)*	Colorless Liquid	26° Be (29.4% NH_3)	Carboys Steel Drums Tank Trucks	Used with chlorine to form chloramines for slime control.
Sodium Fluoride	Powder	90% NaF 95% NaF	Fibre Drums	Preservative and stabilizer for starch in coating mixtures.
Tetrasodium Pyrophosphate, Anhydrous $Na_4P_2O_7$ *(TSPP) (Pyro)*	White Powder	98% $Na_4P_2O_7$ (Equiv. 52% P_2O_5)	Bags Fibre Drums	Felt washing; pitch dispersion.
Nitric Acid HNO_3 + water	Liquid	42° Be 67.2% HNO_3	Carboys Drums Tank Trucks	Nitrating pulp; cleaning monel metal.
Sodium Sulfide Na_2S + water	Red Chips or Solid Mass	60% Na_2S	Steel Drums	Substitute for salt cake in modified soda process.

BASIC CHEMICALS

FOR AMERICAN INDUSTRY

The products advertised are commercial chemicals having various uses, some of which may be covered by patents, and the user must accept full responsibility for compliance therewith.

OTHER PRODUCTS: Hydrochloric Acid; Sodium Metasilicate; Trisodium Phosphate; Copper Sulphate; Disodium Phosphate.

FOR THE LABORATORY OR SPECIAL APPLICATIONS: BAKER & ADAMSON REAGENTS and FINE CHEMICALS

GENERAL CHEMICAL DIVISION

· ALLIED CHEMICAL & DYE CORPORATION

40 RECTOR STREET, NEW YORK 6, N. Y.

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In Wisconsin: General Chemical Company, Inc., Milwaukee, Wis.

In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

Various groups of mills in different parts of the country have banded together to support research efforts at colleges and other research institutions on such problems as waste liquor treatment and disposal. By taking advantage of these existing research organizations it would be possible for the pulp and paper industry to support a forceful program of research that should, in the course of time, help tremendously in defeating the predatory forces that are taking such a heavy toll of our raw materials.

D. C. Everest, in a talk before TAPPI last year, had this to say about the problem: "We must realize that this is a long-range program and that much of our present supply (of wood) is infested with bugs or infected with disease . . . our primary need is more entymologists and pathologists . . . if we are to preserve our wood supply we must start at the source of our trouble and through research, extend the life of our trees now growing. . . . The pulp and paper industry is the logical agency to start such work on a broad base."

America Increases Its Economic Area

THE PAPER INDUSTRY is off to a good start in its first month of this year's operations.

Production for the month of January for paper and board tonnage will crowd the 2 million ton mark, reflecting about a ten per cent increase over the same month a year ago when the total was 1,747,000 tons.

The causes that brought about the spectacular recovery in paper industry production from the July low of 1,348,000 tons to the present high level are still apparent, viz; the continuance of the huge consumption of goods as was made in 1948, plus the unprecedented increase in additional consumers due to increased population.

General business also made a handsome recovery for 1949 despite the Truman recession year; the retail sales in the United States for last year turned up at 128 billion dollars, a shrinkage of but 1.5 per cent under the all-time high year of sales in 1948 which total was 130 billion dollars.

Last year at this time the industrial and commercial psychology was sour. Mr. Truman's election and his following claims of a "mandate" to foist upon this country the New Deal higher income taxes, limitless spending and economic and domestic regimentation, sent business into a tailspin for seven consecutive months.

What a contrast to the sweetness of business psychology today.

We have the January message from the President, also the Budget.

The "mandate" claim has evaporated.

The demand for higher income taxes is out the window, and even cuts in excise taxes suggested. But not a word of cutting the high cost of Government which has been upped 800 per cent since 1939!

To be sure "limitless spending" has the budget-makers usual sugar-coated, Santa Claus appeal. But—the President knows, and Congress knows, and the people generally know, that these extra-curricular drains upon the country's economy have little or no chance of passing into legislation.

Hence business is forging ahead into this election year of 1950 with a prospective high volume, which barring catastrophic happenings that at present writing are not apparent, will probably result in another all time high year of prosperous operations for the Nation.

We had more than 150 million of the best paid, highest standard of living consumers in the world at the end of 1949, a growth of almost 20 million persons over 1939.

We shall add another 2.5 millions more in 1950 in all probability.

What it all means, and what its farflung potentialities are, few have been able to grasp and comprehend. For the pace has been so rapid, unparalleled, and kaleidoscopic during the past eleven years that there has been little opportunity to pause and compare.

However, Dr. Edwards, economist and research director of Manhattan Research Associates of New York, brings out some facts which give us some concrete insights which will help to illumine the picture.

"There was a net addition to our population during the past two years (1947-1948) of over 5 million people. At this rate of growth we are adding to our population the equivalent of a new Pittsburgh every eight months, a new Boston every two months, and a new Chicago every nineteen months.

"Together with the actual population growth of 15 millions there has been added to our domestic markets since the prewar 1939, the equivalent of the whole of 1939 population living west of the Mississippi plus the states of Illinois, Indiana, Michigan, and Wisconsin.

"Thus we have a new economic empire!

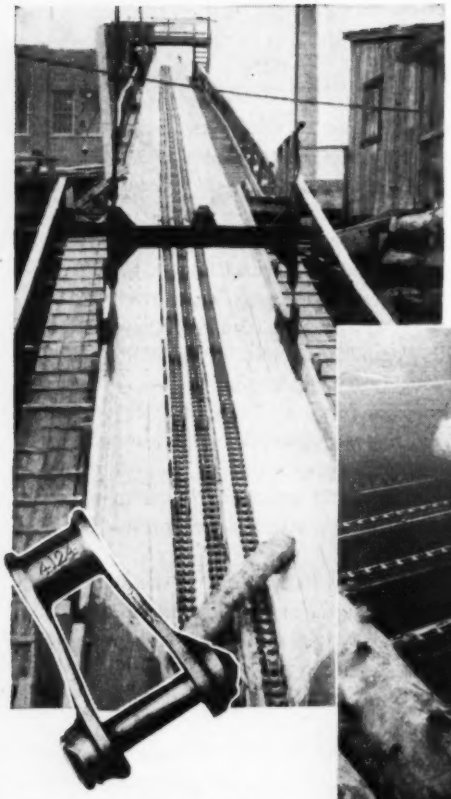
"It means that under current economic conditions there is a 50 per cent greater demand for units of goods as compared with a decade ago.

"This is not a theory—it is fact!"

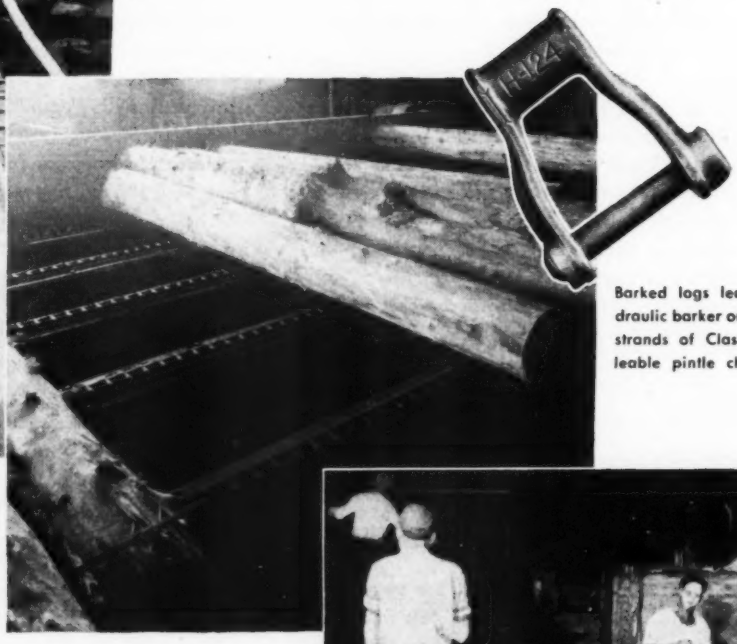
The dynamic powers back of our economic expansion are free enterprise, freedom of individual initiative and increased population.

LINK-BELT CHAINS

for Superior Service in pulpwood log handling



From boat to woodroom, logs are carried by #4124 pintle chain of Promal, the stronger, longer-wearing metal.



Barked logs leaving hydraulic barker on multiple strands of Class H malleable pintle chain.

Nine strands of Class C combination chain of malleable iron and steel, form this sorting conveyor taking logs from barking drums to chipper, or to groundwood log storage on upper floor.

Pulp and paper mills interested in efficient operation and low overall costs find that Link-Belt chains and sprockets for drives and conveyors give them these qualities in extra measure. From the various Link-Belt types, with numerous variations as to size and attachments, can be supplied a chain precisely suited to each application. Link-Belt's long experience and unmatched facilities assure you superior performance and long life on any installation.

Consult Link-Belt on conveying, materials handling and power transmission problems.

11,596

LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices, Factory Branch Stores and Distributors in Principal Cities.

LINK-BELT

CHAINS AND SPROCKETS

for conveyors • for drives • for power transmission

Congressional Analysis

▸▸▸ Testimony given by high officials in the steel industry before a Congressional Committee has developed an economic picture which applies to paper as well as to steel. The testimony was given in reply to attacks on the steel industry for raising prices on its product following its agreement with labor to grant pensions of $100 per month. The witnesses stated that the steel mills today are not earning sufficient to pay adequate dividends and at the same time retain funds for plant replacement, improvements or new construction. Federal tax regulations force the companies to put large portions of earnings into plant replacement, instead of paying dividends to stockholders. This discourages investment in corporate stocks and forces the companies to go into the market to borrow funds for development purposes. Admiral Ben M[illegible]el (retired), president of Jones [illegible]aughlin, estimated that an 8 per cent return in dividends is needed to encourage public investment, and that to assure funds for plant expansion and replacement there should be a return in profits of 24 per cent on capital investment.

Use Economic Yardstick for All Industry

While this analysis was made in behalf of the steel industry, the economic theory is equally applicable to the paper industry, which in recent years has been forced to finance expansion to the extent of hundreds of millions of dollars through underwriting of bond issues and similar securities through investment houses rather than by subscription from stockholders.

P.I. Forecast Continues Bright

Forecasts of paper industry operations in 1950 have been coming forward from various economists and students of business trends, and all seem to agree that operations will be continued through the first half—at least—of 1950 if anticipated demand is to be met. The last quarter of 1949 broke all records for tonnage output and there is no indication that for many weeks to come there will be any material drop in production. Inventories are at an adequate level, and the channels from mills to consumer can be expected to permit a normal flow without clogging by excess inventories or consumer shortage by reason of lack of stocks on hand.

Informed sources have estimated that 1950 production will be some 5 per cent above 1949 output, or only 5 per cent below the previous record high. Of course such predictions are on the assumption that no untoward circumstances disrupt the over-all American industrial picture. Some kraft mills are from eight to twelve weeks behind orders. The depreciation of Scandinavian currency resulted in such a rush of orders for this grade that the mills are discouraging additional orders until deliveries can catch up with the back log of orders. In this field the depreciation of the kroner resulted in offerings and deliveries of kraft paper at a Swedish price of about 5 cents per pound as against the 10 cent quotation a year ago, and the same condition exists in sulphite wrappings, particularly the machine glazed. As a result shipments have run ahead of Swedish production.

Welfare State Will Not "Fare" So Well

Washington developments indicate that the Administration will not be too successful in its welfare state proposals. Even the President's proposal to cut excise taxes and substitute increased levies on corporate income is not meeting much favor. An administrative trend toward the restriction of development of large corporation activities is becoming more evident. An entirely new theory is being developed by the Department of Justice, where it is announced that steps will be taken to extend the antitrust laws to cover the operation of large concentrations of industry, on the theory that while monopoly does not now exist such concentration might some time in the future lead to restriction of competition. This is an overt attack on big business as such. The Federal Trade Commission is paralleling this proposal with efforts to secure comparable power for itself.

May Ask Govt. to Aid in Newsprint Situation

While one congressional group is attacking the steel price problem, Congressman Celler of New York says his Judiciary Committee will try to force down what he calls the impossible prices for newsprint. He suggests that government help be provided for the development of newsprint sources in the United States. He blamed exorbitant newsprint prices for the publishers financial difficulties and said more and more newspapers will be forced to the wall. The argument against government subsidies for newsprint mills will be that the public should not be forced to pay higher taxes to finance relief for the newspapers. One student of the newspaper picture questions the claims that high prices for newsprint are responsible for newspaper publication difficulties. Newsprint now costs five cents per pound—the cheapest price for any form of paper—and it takes forty pages of the ordinary sized newspaper to weigh one pound. Street sales of metropolitan newspapers have risen to 5 cents each as against prewar sales at 2 and 3 cents per copy. Every additional page published by any newspaper above a minimum required to carry its news and features provides a large return in the sale of advertising space. It is difficult, therefore, to see how the 2½ cent per pound increase in the cost of its paper in recent years would bankrupt any publication.

Newspaper publishers, however, have been taking steps on their own account to secure domestic sources of supply. The Southland company, in existence for several years, was largely financed by newspaper publishers who thus have a guarantee of supply as well as a share in the manufacturing profits, if any. The same is true of one of the biggest developments in the south, the Coosa River multi-million dollar enterprise which began operation in the last week or so. Another development was the experimental use of bagasse, the waste fibre of sugar cane, at a mill

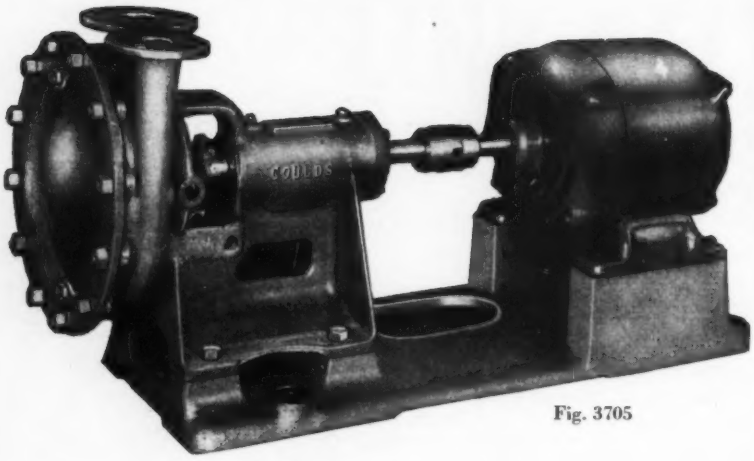


Fig. 3705

For Outstanding Service Handling Corrosive Liquids—

Goulds new stainless steel centrifugals

ADVANCED PUMP DESIGN—

The Goulds 3705 stainless line represents the last word in effective design. Fig. 3705 pumps will give you efficient, dependable, 24-hour service in handling corrosive liquids—at low cost.

CAPACITIES—

Goulds stainless steel centrifugals are made in 8 sizes with capacities to 750 G.P.M. and heads to 180 ft. depending upon capacity.

ADVANTAGES—

Exceptional efficiency (see Bulletin for performance curves) plus extreme simplicity make this an ideal pump for corrosive applications. High interchangeability of parts cuts stocking problem. Quick inspection or cleaning—simply remove casing cover without disturbing pipe connections.

MEMBER HYDRAULIC INSTITUTE U.S.A.

Write for Bulletin 725.3 for complete details on this new stainless steel pump.

Goulds PUMPS INC. Seneca Falls New York

in Holyoke, Mass. A sample outtrun of newsprint was made in that mill the last week in January.

Newsprint Crowding Textiles in the South

A New York newspaper has printed a special article calling attention to the fact that the production of paper from southern pine is rapidly becoming the chief industrial output of the South. While the textile industry, according to this survey, has been bemoaning the migration of its mills to the South, the expansion of the paper industry has gone practically unnoticed. In 1950 the paper industry in the South will employ nearly 120,000 workers, with a billion dollars invested in the production of a large part of this country's entire output of paper and paperboard. These mills, it is estimated, will pay over $100,000,000 this year to the owners of small woodland tracks for pulpwood.

May Ease Tax Laws as Aid to Stream Pollution

For years the paper industry has been facing the problem of eliminating industrial waste from the nation's rivers. For a long time the paper industry carried the brunt of the campaign to prevent radical legislation, and the paper industry also carried on an intensive campaign to develop procedures for the elimination of waste from the nation's streams. Now, however, the importance of this problem has been recognized by other major industries and they are uniting in asking Congress to ease the tax laws as a means of encouraging an early start on what is called a two billion dollar job of eliminating stream pollution.

Financial

▶▶▶ JANUARY SAW stock market securities reach new high figures. The upward movement hesitated the last week in January but differences of opinions in the Wall Street area raised some question as to whether the so-called bull market has reached its peak.

Celotex Corp.—Net income for the year ended October 31, 1949, was $1,949,190, a sharp drop from the $6,785,180 reported for the previous fiscal year.

Hammermill Paper Co.—Net profit for the third quarter of 1949 was $180,682 compared with $433,533 for the same quarter a year ago.

Marathon Corp.—Net income for the calendar year 1949 was $4,519,217 as against $5,593,238 for the previous year.

West Virginia Pulp & Paper Co.—Net income for the fiscal year ended October 31, 1949, was $9,014,847 as against $10,842,169 for the previous year.

Paper Mill Corporate Changes

Hummel & Downing Co.—Hummel & Downing Co. of Milwaukee, established in 1902 and operated since 1941 as a wholly owned subsidiary of Cornell Wood Products Co., has been formally merged with the parent company and will be operated as a division of Cornell in future.

Berwin Paper Co.—A new corporation known as the Berwin Paper Manufacturing Corporation, headed by Victor Cohen, has been formed to take over and operate the tissue paper mill at Dansville, N.Y., formerly owned by Berwin Paper Co.

West Virginia Pulp & Paper Co.—Cumulative Preferred Stock to the amount of 3,018 shares has been called for retirement at $106.12½ per share.

Carolina Paper Mills—The former Sunoco Paper Mill at Rockingham, N.C., will become the first tissue paper mill in the South under its new ownership to be known as Carolina Paper Mills, Inc., financed by the Resolute Paper Products Corp. of N.Y., also owner of the Windsor Locks Connecticut paper mill.

A. M. Collins Mfg. Co.—The old Philadelphia plant in existence for nearly 100 years has been placed on a practical operating basis with new capital which has paid off all of the old indebtedness. Lawrence B. Kelley is president of the reorganized company.

Frontenac Paper Corp.—The old Frontenac mill at Dexter, N.Y., has been sold at auction to a Watertown, N.Y., real estate broker to satisfy a mortgage held by the Dexter Sulphite Pulp & Paper Co. which may again take over the property.

New York Stock Exchange—Stocks

	Closing Prices Jan. 25, 1950	Dec. 31, 1949
A.P.W. Products	3⅜	3⅛
Celotex	19⅜	18⅝
Same Preferred	*17-17½	17¼
Certain-teed Products	16⅜	16
Champion P & F Co.	33⅜	31½
Same Preferred	*99-100	98¼
Chesapeake Corp.	*25-25⅜	24
Container Corp.	40⅜	39
Same Preferred	*102½-104	102
Continental Diamond	8¼	8⅛
Crown Zellerbach	30⅞	29¼
Same Preferred	102½	104
Same $4 Preferred	*100½-103	99⅜
Dixie Vortex	*36-37	37
Same "A"	*52⅜-54	51½
Eastern Corp.	14¼	15½
Robert Gair	7⅞	7⅝
Same Preferred	18	18½
Gaylord Container	19¼	19⅜
International Paper	34⅝	36⅝
Same Preferred	*103-104½	103½
Kimberly-Clark	24⅞	24⅜
Same Preferred	109¼	107½
McAndrews & Forbes	*40-40½	41½
Marathon	26¼	25
Masonite	59	59
Mead Corp.	16⅜	14⅝
Same Preferred	*89-91	82
Same 2nd Preferred	*34-35	31½
National Container	8¼	7½
Paraffine Cos	19⅜	20¼
Same Preferred	*100-102½	102
Rayonier, Inc.	24½	27
Same Preferred	31	30⅛
Scott Paper	68¼	70
Same $3.40 Preferred	*94⅜-95	98
Same $4 Preferred	*106-107	107
St. Regis	8¼	8⅛
Same Preferred	*86-87	86
Sutherland Paper	39¼	39¼
Same Preferred	107½	108
Union Bag & Paper	27⅝	28⅞
United Board & Carton	8⅞	8
United Wall Paper	3⅜	3½
Same Preferred	*26-28	—
U. S. Gypsum	111½	113½
Same Preferred	*184⅜-186	183⅝
West Va. P & P Co.	46	50⅜
Same Preferred	*108-109	108

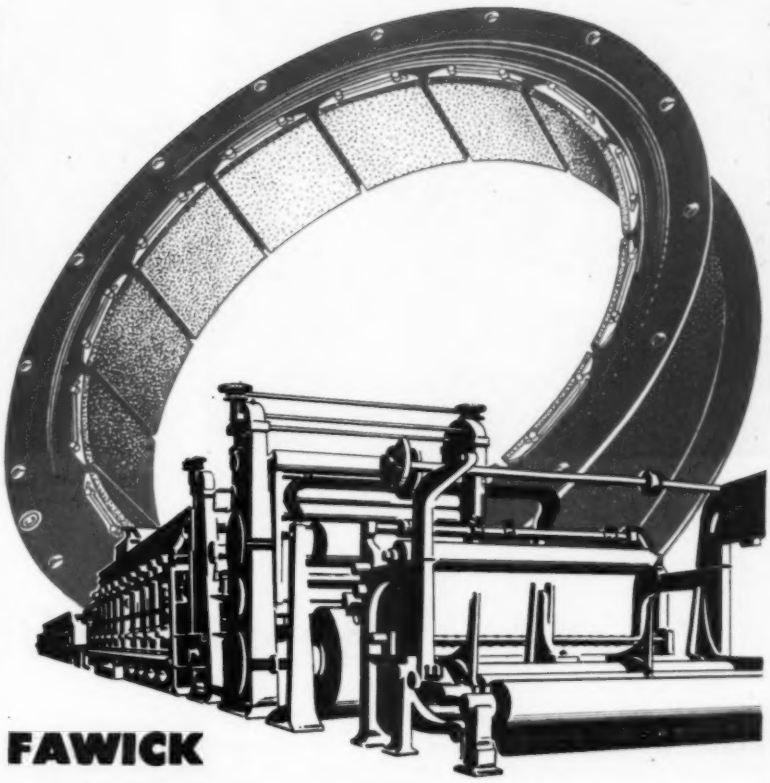
New York Stock Exchange—Bonds

A.P.W. Products 3%	82	78
Celotex 3½%	—	102
Champion P & F 3%	102⅜	102⅝
Mead Corp 3%	103	102½

New York Curb Exchange—Stocks

Am Writing	*6¼-6½	6⅝
Great Northern	41	41

*Closing Bid and Asked Prices



FAWICK
CLUTCHES INSURE
DEPENDABLE PERFORMANCE
IN PAPER MILL OPERATION

Gradual shock-free acceleration, constant running speed, and controlled deceleration of paper mills can be obtained with Fawick Clutch and Brake Units in the drive lines. Any degree of acceleration or deceleration may be obtained.

The simplicity of design in Fawick Clutches eliminates many hours of adjustment and maintenance time in this self-adjusting unit. This factor plus the exceptionally long life inherent in Fawick Clutches provides new standards of efficiency for paper mill operation.

For specific information on all advantages of Fawick Industrial Clutch and Brake Units, write to the Main Office, Cleveland, Ohio, for Bulletin 300.

All desirable clutch characteristics are built into Fawick Airflex units

FAWICK Airflex CO., INC.
9919 CLINTON ROAD CLEVELAND 11, OHIO

Bleached bagasse pulp before being made into paper

Visitors watch bagasse paper coming from paper machine dryers

Paper from Bagasse Pulp Is

▶▶▶ AN EVENT of significance in the paper industry took place in Holyoke, Mass., on January 27 when a special edition of the *Holyoke Daily Transcript* was printed on paper made from bagasse pulp.

The raw bagasse from which this paper was made was pulped and bleached by a process developed by the Kinsley Chemical Co., Cleveland. The paper was run off in the plant of the Chemical Paper Manufacturing Co., in Holyoke. Copies of the newspaper's special edition were available to those attending the public demonstration of bagasse papermaking at the Chemical company's plant on January 28.

This demonstration is tangible evidence of the successful utilization of this sugar cane waste as a papermaking raw material. The manufacture of paper from bagasse pulp and its use by demonstration climaxed a series of experimental operations wherein the Chemical Paper Manufacturing Co. made available its plant facilities to the Kinsley Chemical Co. Both bleached and unbleached bagasse pulp were used to manufacture different weights and grades of paper from corrugating medium to printing papers such as that employed to print the special edition of the *Transcript*.

In all of these experiments, the cooking, washing, and bleaching operations were directed by E. R. Timlowski, of the Kinsley Chemical Co.

Frank Hayes, of the Noble & Wood Machine Co., directed the refining operations which utilized a unit designed particularly for bagasse pulp.

Actual papermaking operations were under the direction of C. J. Yarber, general superintendent of Chemical Paper Manufacturing Co.

While the details of preparing bagasse pulp were not discussed by the Kinsley Chemical Co., it was stated that yields were obtained of over 60 per cent for unbleached bagasse, and over 50 per cent for bleached grades.

The purpose of the demonstration was to show that 100 per cent bagasse pulp could be employed to make commercial grades of paper suitable for printing of newspapers.

H. Lee Kinsley, pres. Kinsley Chemical Co.

Harry N. Wier, pres. Noble & Wood

Particularly significant is this development to those countries which do not have wood pulp resources, but which do have adequate supplies of bagasse. The government of Argentine is vitally interested because of the fact that Argentine capitalists, industrialists, and technicians have organized to finance an Argentine pulp and paper project known as Fibrocel S. A., which proposes to utilize the technique and processes of the Kinsley Chemical Co., in the manufacture of newsprint from bagasse, wheatstraw, and fibers of other annual growths.

Fibrocel was represented at the demonstration by Alvaro S. Alsogaray, Argentine industrialist and engineer. Commenting on this new development he said that in Argentine there exists an abundance of bagasse whereas there is a great scarcity of forest growths adapted to the manufacture of wood pulp. He stated further that rolls of the bagasse newsprint manufactured in Holyoke will be sent to Buenos Aires for tests and for use in one of their own newspapers.

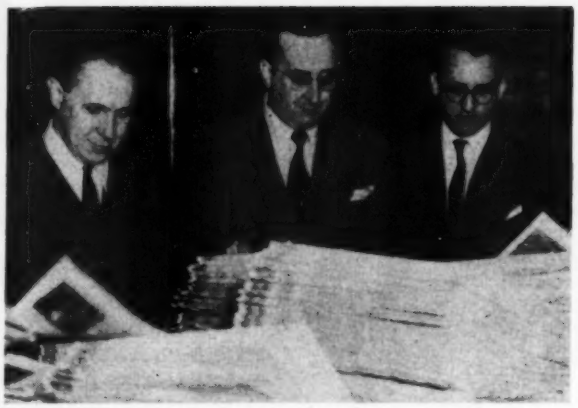
Other foreign representatives attending this demonstration were:

Jaime Vick, San Juan, Puerto Rico, commercial director of all government-owned industries operated by the Puerto Rico Industrial Development Co.; vice president and general manager of the Puerto Rico Pulp and Paper Corp.

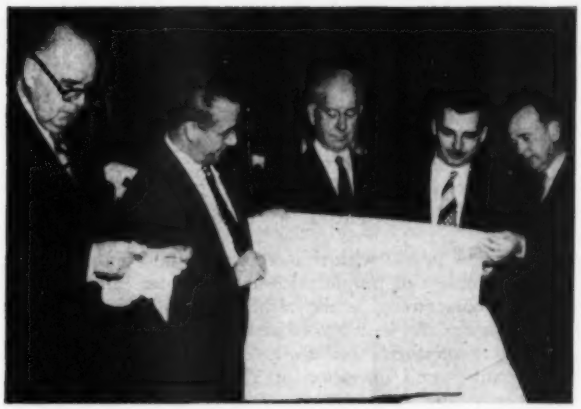
Cesar Augusto Bunge, Economic Counselor of the Argentine Embassy in Washington; official representative designated by the Argentine government.

Barolome Bruera, engineer, delegated in the United States of the Yacimientos Petroliferas Fiscales (Argentine Government Oil fields). Official representative designated by the Argentine government.

Walter Scott, Port of Spain, Trinidad, B.W.I., consultant to the Central Secretariat of the Caribbean Commission. The membership of the Caribbean



Looking at Holyoke Transcript, first newspaper to be printed on paper made from bagasse. Left to right: Alvaro C. Alsogaray, Argentine industrialist and engineer, representing Fibrocel, S. A.; Bartolme Bruera, Argentine engineer, and Ceser Augusto Bunge, economic counsellor of Argentine Embassy in States



Examining bagasse paper, left to right: Joseph Glenn Weimer, Kinsley's director of international bagasse activities; Clifford J. Yarber, gen. supt., and Ralph H. Morrill, vice pres. and gen. mgr., both of Chemical Paper Mfg. Co.; E. R. Timlowski, creator of bagasse development, and Frank Hayes, Noble & Wood Machine Co.

Demonstrated in the "Paper City"

Commission consists of the United States and all Caribbean republics and possessions.

Ernest Kelen, Shanghai, China, paper-mill owner, and Theodore Brown, of New York, both representing the China-American Paper and Pulp Co., Inc.

Henry R. Black, Wilton, Conn., representing Australian industries.

Government and industrial observers from other foreign countries interested in the bagasse demonstration included Brazil, Peru, Mexico, Santo Domingo, Haiti, Australia, India, Pakistan, and South Africa.

The raw bagasse utilized in the Holyoke runs was provided by the Puerto Rico Pulp and Paper Corp., one of the operations of the Puerto Rico Industrial Development Co.

Joseph Glenn Weimer, director of international and bagasse activities of Kinsley Chemical Co., stated that a company probably would be organized under the laws of Argentina to administer the operations in South America of the subsidiary company he is to head. The Kinsley Chemical Co. has announced that until permanent headquarters for the new bagasse corporation are established, all inquiries related to the bagasse development of the company should be directed to Mr. Weimer, 41 East 42nd Street, New York 17, N.Y.

KVP Confident Legal Matters in Canada Will Be Adjusted

In the interests of clarity, *The Paper Industry* has solicited complete information back of the widely published press releases concerning legal problems encountered in Canada by K. V. P. Ltd., Espanola, Ontario. Published here is a statement from R. A. Hayward, president of Kalamazoo Vegetable Parchment Co., Parchment, Mich., and its subsidiary, the Espanola company.—*Editor's Note*

▶▶▶ CAUGHT IN A SNARL of legal technicalities that menace its continued operation, the Espanola subsidiary of the Kalamazoo Vegetable Parchment Co. is now looking to the Ontario legislature to solve its difficulties.

"The legislature meets February 15," said Ralph A. Hayward, KVP president. "In view of an action it took last year we feel confident it will straighten the tangle out sometime this session."

The trouble grew out of a suit by six persons downstream from the pulp and paper plant on the Spanish River purchased by KVP in 1943. Charging pollution and demanding damages, they invoked an old English common law dating back to the 15th century. Mr. Hayward explained.

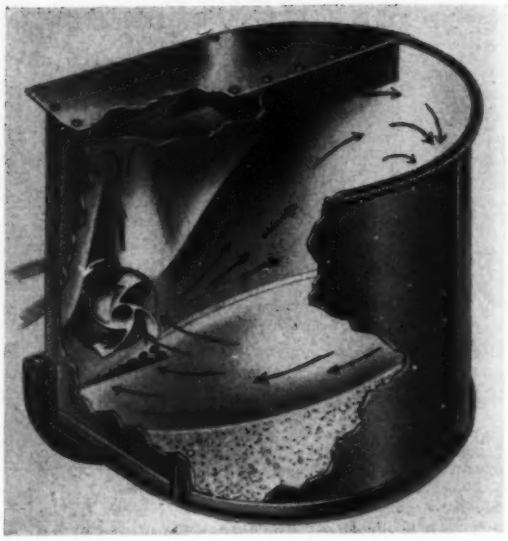
"From that beginning," Mr. Hayward said, "the suit developed through the courts to a point where it involved the basic rules of operation of the supreme court of the Province and the privy council. It also brought an enactment by the legislature last year presumed to correct the situation.

"However, because of the rigid rules governing the supreme court, it could not consider that law. Now only the legislature by a further enactment this session can straighten the matter out. That is the development we are awaiting, confident that the legislature will take action which will make its intent, expressed last year, effective."

The suit was brought shortly after the Espanola plant was put back in operation after its purchase by KVP. It charged pollution of the Spanish River by sulphite waste after the six men who started it offered to settle for $300,000, waiving claim to any past and future damage.

KVP fought the suit, lost it on the application of the old English law that nothing can be put in a stream that will change the nature of the water—provision aimed at barnyard practices of farmers of that day. Also in the suit

Cowles Announces New Side Drive Pulper



A new pulper was introduced to the trade recently when Edwin Cowles, president of Cowles Co., Cayuga, N.Y., inventor and patent holder of the Hydrapulper, announced the Cowles Side Drive Pulper.

This new pulper which incorporates a new and refined approach to the problem of pulping down stock more efficiently, at a lower rate of horsepower, is the result of many years of research and development. As its ultimate aim the new pulper had to meet the following requirements: power efficiency; fast pulping, thorough defibering; good operation at all levels; good submergence circulation under all conditions; fast, clean and complete dumping; no dead spots; minimum of building, floor space and head room requirements; rugged, simple and economical construction; horizontal shafting and drive mechanism; and freedom from clogging or jamming with any furnish or type of operation.

Efficient pulping with good circulation is accomplished in a side drive Cowles Pulper by locating a relatively small fast running impeller at the bottom of a side, this impeller being mounted on a horizontal shaft. This impeller is then partially shrouded by a member somewhat resembling a part of the volute of a centrifugal pump. The drawing will show that the purpose of the shroud is to collect and direct the discharge from the impeller so that the entire discharge is in one general direction and tangent to a side wall to accomplish a circular movement. In this way the side drive pulper accomplishes good circulation at all ordinary consistencies with a comparatively small fast running impeller and this is the basic secret of the success of the machine. These impellers run at from 200 to 500 rpm instead of from 100 to 250 rpm. These higher speeds not only increase the pulping efficiency but they also reduce the cost of the drive mechanisms without in any way impairing its reliability. The exact speeds and details of impellers are determined by each mill's requirements.

Obviously there must be more to the circulator action than the mere rotation of the stock in the tub. For example, the stock must move from the bottom to the top, from the top to the bottom, from the inside to the outside and from the outside to the inside. This is accomplished by the departure from a circular shape, by the location of the impeller and by the fact that the suction of the impeller and the discharge of the impeller distort this circular movement. The impeller is also located at the very bottom of the tub and the discharge is not only of a tangential nature but also strongly upward which keeps lifting the stock from the bottom to the top.

Fast, clean dumping is accomplished by providing a very steep slope to the bottom, the lowest point being under the impeller. A perforated plate, or extraction plate as it is called, is located in the lower portion of the impeller housing and under the impeller. Stock drains naturally to this point and through the extraction opening. The openings are washed by the discharge from the impeller which prevents clog-

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KVP . . . .

(From preceding page)

nothing was said of the fact that the mill had not been in operation for about 30 years before KVP bought it. An injunction barring operation within a certain time if dumping of sulphite waste was not stopped was granted.

Incidentally, Mr. Hayward pointed out that everything possible had been done at Espanola to mitigate pollution and the company has reduced the condition by every means known to science. That the matter is highly complicated is shown by the fact that Sweden has been working on the problem since 1917 and has not yet found a workable solution.

Following granting of the injunction by the lower courts, KVP appealed to the higher courts.

Then the Ontario legislature, recognizing that all its scores of paper and pulp mills were periled, passed a law protecting them against such injunctions, charging the judges to take into consideration all the economic factors involved in suits for injunctions. It also specified that mills which had "pending suits" were included. That, it was thought, would certainly cover the Espanola case.

Meanwhile the case was carried to the supreme court by KVP. There the company lost again in spite of the new law. This was because the supreme court of the province can take into consideration only original testimony in a case. This testimony, Mr. Hayward pointed out, said nothing about prior operation of the mill. Also it did not, of course, present the intent of the legislature as expressed in the later law.

An added complication was injected into the situation by a ruling of the supreme court that the later law did not apply anyway, even in view of the "pending case" provision. This, said the court, was not a "pending case," since the lower court had acted and rendered a verdict.

Further complications developed when it was attempted to take the case for review to the privy council. "That body," Mr. Hayward said, "is the only one which can consider new evidence in reviewing an action by the supreme court. But in view of the fact that Canada is cutting loose from the control of English law this year, the privy council refused to take any new cases under consideration.

"So we come back to the legislature as the only body that can relieve the situation," said Mr. Hayward. "In view of its action last year which expressed its intent to protect paper and pulp mills, we are confident it will correct the law so that the Espanola operations will also be covered.

"If it does not, the Espanola plant will have to be closed by about April and the town will have to sink back to the 'ghost' town it was when we took over," Mr. Hayward said.

"That I don't believe the legislature will permit, especially since it was instrumental in handling the sale of the property when we bought it and has been most cordial in its attitude ever since."

ging. This is an aid to speedy dumping.

Good submergence is caused by providing an opening at the top of the shroud or volute which partially surrounds the impeller so that a portion of the discharge of the impeller is led upward. It spouts above the surface of the stock and cascades down on the stock. The suction of the impeller is located immediately below this point so that floating material is led underneath the cascade and at the same time it is subjected to the impeller suction.

Splash is controlled first by locating the impeller which is relatively small at the very bottom of a relatively deep tub. The tub is then so shaped that most of the discharge from the impeller encounters a curving side long before it reaches the top of the tub. There is also a decking above the impeller which deflects any remaining splashing downward into the tub. This decking is at such an elevation that it is slightly awash at the maximum operation level. It is so located because the underside will then be washed clean every time the pulper is filled and there will be no accumulation of dried pulp. A section of the decking or splash guard at the impeller end is slightly elevated and angled so that at maximum operating level floating materials will slide under and encounter the upward discharge from the impeller and be submerged.

Clogging and jamming does not occur because the tub is unobstructed and the impeller is only partially shrouded. As a further guard against any such action ample clearances are provided around the impeller and care has been taken to avoid any pocket, edge, opening or surface where suspended materials might lodge.

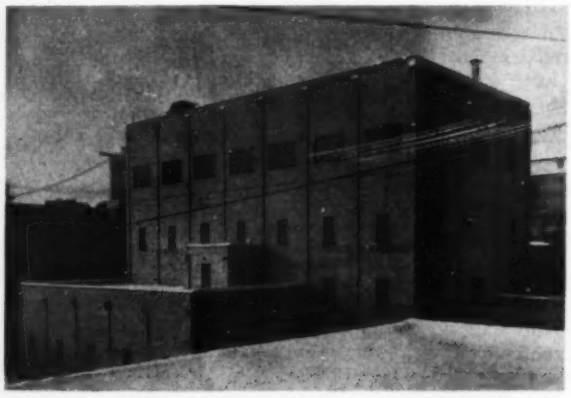
New Sulphite Bleaching Facilities Announced By Mando

▸▸▸ SULPHITE PULP for making finer grade paper products can now be processed in Minnesota and Ontario Paper Company's newly completed bleach plant at International Falls, Minnesota.

Although the bleach plant has been in partial operation since early 1949, the plant was formerly capable of bleaching only kraft pulp until additional facilities were completed last month. Now the plant is capable of processing 100 tons of each variety every 24 hours.

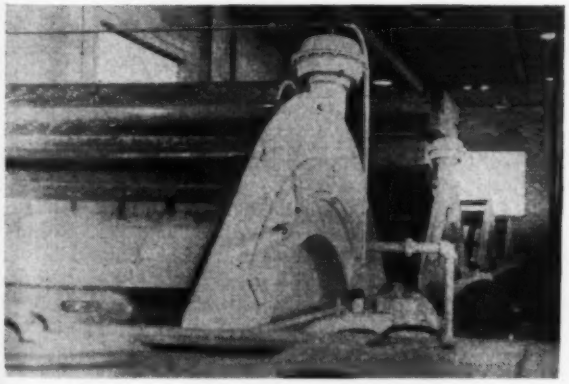
The new bleach pulp, according to Clarence Larson, vice president in charge of production, will enable Mando to manufacture paper products of greater brightness than was possible with the unbleached pulp. The new facilities were constructed under Mando's general improvement and modernization program aimed at providing greater flexibility of operations for new and better paper products.

The kraft section of the plant—



Mando's recently-completed bleach plant at International Falls, Minn., is capable of processing over 200 tons of bleached kraft and sulphite pulp every 24 hours

Control laboratory permits continuous check on pulp at various stages. Finished product must be uniform in strength and color. Test being run by Gerald Adams



Present sulphite bleaching operations employ a two-stage process. Vacuum washers on operating floor of bleachery remove chemicals and impurities from pulp

Snow-white pulp, not unlike cake frosting, is pictured on revolving screen of washer in final stage of bleaching process

housed in the south half of the five-story brick building—was finished first and has been used alternately to process kraft and sulphite pulp as mill operations required. Now that the second, or sulphite, side is in service, the paper mill is assured of an ample supply of both kinds of bleached pulp at all times.

Mando's sulphite bleaching is a continuous process which employs direct chlorination and a low density hypochloride treatment to remove every trace of color from the raw pulp. Large vacuum washers, located on the top or operating floor, remove the chemicals from the pulp after each stage of treatment.

The many millions of gallons of filtered water needed for the newly constructed bleach plant will be furnished from the recently completed Mando filtration plant which is capable of refining to almost unbelievable purity over 15,000,000 gallons of water every 24 hours. This filtration plant also furnishes water to the city of International Falls.

Mando Will Modernize Insulite Machine

The No. 3 Insulite machine in the International Falls, Minn., plant of Minnesota and Ontario Paper Co. was shut down the latter part of last month in a modernization program which was expected to immobilize the unit for about five weeks.

The machine, which has been in operation since 1929, is being completely overhauled and fitted with improved equipment, with work being done on both the kiln and wet end of the machine. All drive chains in the kiln will be renewed and the unit realigned, and the kiln will be converted from a 2 to a 3-unit circulation system to provide for faster and more uniform distribution of heated air for drying the insulating board.

Wet end improvement will include a new drive for the forming machine, new headbox with agitating equipment, and agitators for the machine chest. A stainless steel covering will be installed on the cast iron press roll.

Regular Mando mechanical and maintenance crews will handle the work of the project under the supervision of C. S. Steed, erector for the Coe Manufacturing Co. of Ohio. Any extra labor needed for the work will be drawn from among the production workers made idle by the shutdown.

ONE HUNDRED THOUSAND pine seedlings averaging 18 inches in height were recently given to Twiggs County, Ga., by Macon Kraft Co., Macon, Ga.

New Paper Machine Is Part of Northern's Modernization Program

A modernization program will soon get under way at Northern Paper Mills, Green Bay, Wis. The program is directed at improvement of present equipment, and will utilize recent advances in papermaking techniques, according to Milan Boex, president.

The principal innovation will be a new paper machine, now on order at the Beloit Iron Works, Beloit, Wis. Installation of the Yankee dryer type machine, which will have 172 in. wire width and 162 in. trim with a diameter of 12 ft. and provision for 125 psi. pressure, which will be motivated by a G-E sectional or helper drive, should be completed by the end of this year.

An extension of the existing mill building will be needed for the new machine. The two and three story addition, 450 x 100 ft., to be constructed of steel, concrete and brick, will be begun early in the spring. Northern's own engineers and construction crews will be in charge of the building's erection.

Other equipment which will eventually be installed includes facilities for utilizing purchased pulp and another unit for bleaching purchased pulp, a dust collection system for Yankee rewinders, improved ventilation, equipment for reducing fiber discharge to the river, and converting equipment.

EXTENSIVE ALTERATIONS are under way at Regal Paper Co., Pulaski, N. Y., to make the company's plant ready for the manufacture of several added lines of paper products. A new oil-fired boiler is being installed, and changes made to heat only the front part of the plant, where all work will be done. The new products planned by the company will probably necessitate about 50 new employees.

Mill Proposed for Arkansas Will be Exempt from Tax

The Arkansas Resources and Development Commission has authorized the exemption of the proposed new southwest Arkansas paper mill from state taxes. *(Cf. PI. and P.W., Dec., 1949)*

The exemption was approved after it was determined that the exemption would become effective when the proposed mill is completed. The state now levies no property tax, but one can be levied by legislative action. Exemption of new manufacturing plants from state taxes for a maximum period of ten years is now legal in Arkansas.

Milan Boex

J. H. Davidson

HEADQUARTERS FOR supervision of the engineering activities of Minnesota and Ontario Paper Co., have been established at International Falls, Minn. Exercising staff supervision over all company engineering activities at International Falls, Fort Frances, Ontario, and Kenora, Ontario, J. H. Davidson, chief engineer, has on his immediate staff F. W. Woodman, electrical engineer, B. J. Shields, mechanical engineer, and A. S. Thompson, estimator.

AWP Sells Parsons Div.

The Parsons Division of The American Writing Paper Corp., Holyoke, Mass., has been sold to the Holyoke Water Power Co. The transferred property includes land, buildings, and appurtenent mill powers but does not include machinery. The Parsons Division was closed down in 1948 when its operations were transferred to other divisions of the paper company.

All machinery remaining in the Parsons Division which has not been sold will be removed to other divisions of the paper company. Operations of The Canada Dry Ginger Ale Co. warehouse located in the Parsons Division will be moved to another division of the company.

The Holyoke Water Power Co. will probably remove some of the buildings from the property in order to enlarge the area available for its new 15,000 kw. hydroelectric plant nearby. Some of the other buildings will undoubtedly remain and be used by the water company for its own operations. Some of the buildings may possibly be made suitable for small industries.

Among the mill buildings purchased by the water company is the oldest industrial building in Holyoke, built in 1827 by the first Hadley Falls Co. as a textile mill. Alfred Smith, a native of South Hadley, was the active head of the Hadley Falls Co. at the time. The property was later purchased by the second Hadley Falls Co. at the time it built the wooden dam across the Chicopee River and laid out the canal system. In 1859 Alfred Smith became the first president of the Holyoke Water Power Co.

Flow Spreader for Cylinder Machines

Stream-Flow Vat System

—a story of product improvement

It was just a few years ago that a box with a cylinder mold was considered a vat . . . and what this vat couldn't accomplish was supposedly beyond the realm of Cylinder Machines.

Then came the Goldsmith Stream-Flow Vat System—an individual forming machine designed and built by Puseyjones with the same thought and care as Puseyjones Fourdriniers. Step by step the Stream-Flow Vat System has been improved. Here are some of the outstanding features—standard, but optional—of the latest Stream-Flow design:

(1) Vacuum Cylinder Mold . . . One of the most important improvements in the history of Cylinder Machines. Formation is greatly improved due to use of vacuum and elimination of spoke disturbance. For single cylinder or multi-cylinder machines.

(2) Stream Flow Vat . . . Progressive improvements and simplifications have been made, including use of stainless steel instead of bronze for flexible, adjustable vat circle; independent front, bottom and back circle adjustments reading directly on dials; an ingenious toggle-operated bleeding and dumping arrangement.

(3) Flow Spreader . . . New compact design. Hydraulic nozzle "squeezes" the flow by decreasing area and increasing velocity during spreading.

(4) Up-Flow Head Box . . . New design assures steady feeding of the vat and permits air to escape.

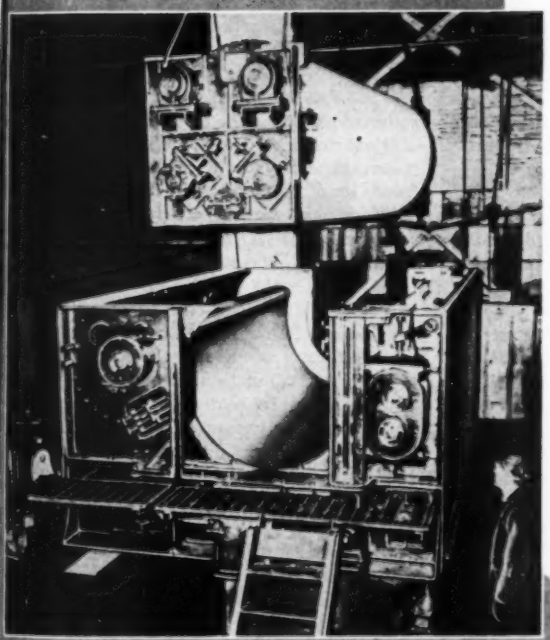
For better formation, higher speeds, a wider range of stock freenesses proven in operation on a wide variety of grades—from thin cylinder papers to roofing felt – investigate the Stream-Flow Vat System. Talk to Puseyjones engineers about doing the job in several steps – the proof of performance is in the operation. Write us today.

THE PUSEY AND JONES CORPORATION

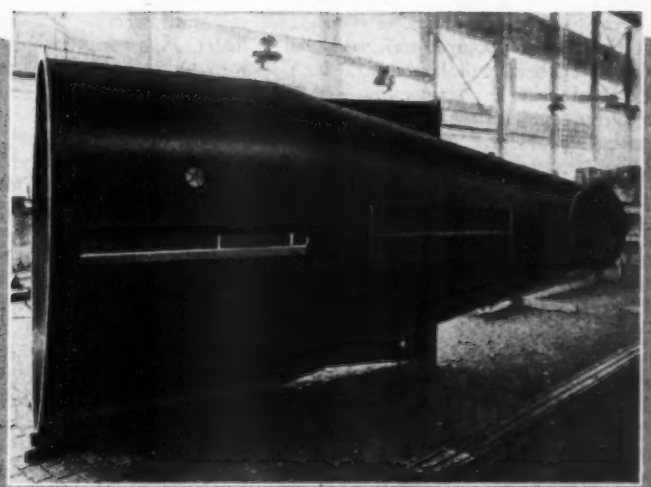
Established 1848. Builders of Paper-Making Machinery

Wilmington 99, Delaware, U.S.A.

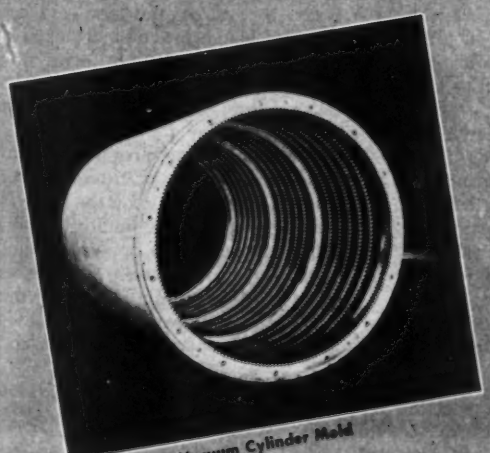
THE SIGN OF TRADE MARK SUPERIOR QUALITY



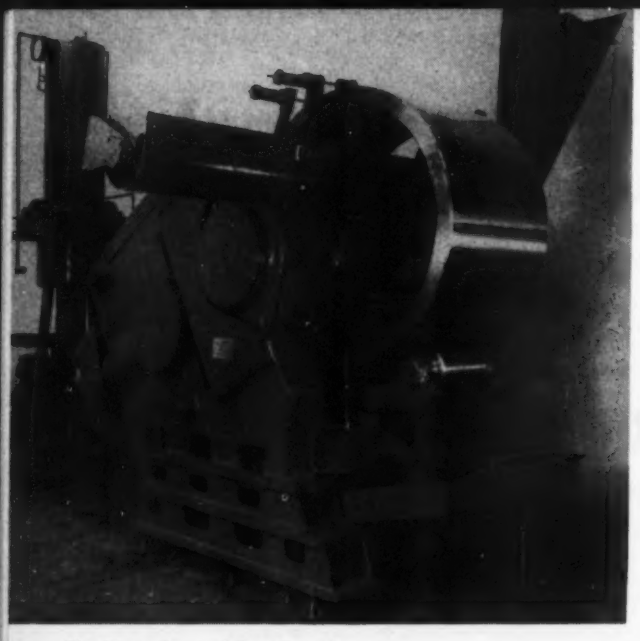
Stream Flow Vat and Mold



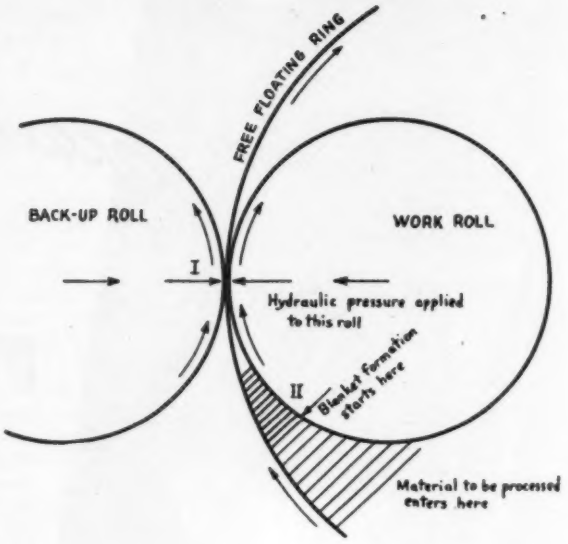
Up-Flow Head Box



Vacuum Cylinder Mold



The Stacomizer and how it works . . . . .



I. Roll assembly at start of operation

Dewatering Bark With a Stacom Press

▸▸▸ SUCCESSFUL experimental operations of a full-scale Stacom continuous roller press for dewatering bark at the Anglo-Canadian Pulp & Paper Mills, Ltd., Quebec, were reported last month at the annual meeting of the Technical Section of the Canadian Pulp and Paper Association at Montreal. Although this press was developed prior to the war, the first full scale unit was built and installed in 1949. Trial runs were made at various pressures wherein the bark was pressed to moistures of 50-55 per cent with throughputs averaging about 70 tons of oven-dry bark every 24 hours.

As a result of the experimental operations during the 1949 season, the press will be placed in continuous operation during the 1950 wood handling season at the Anglo-Canadian mill and the dewatered bark will be burned. It is expected that a considerably higher steam output will result than has been possible previously when other means of bark preparations were employed.

How It Works

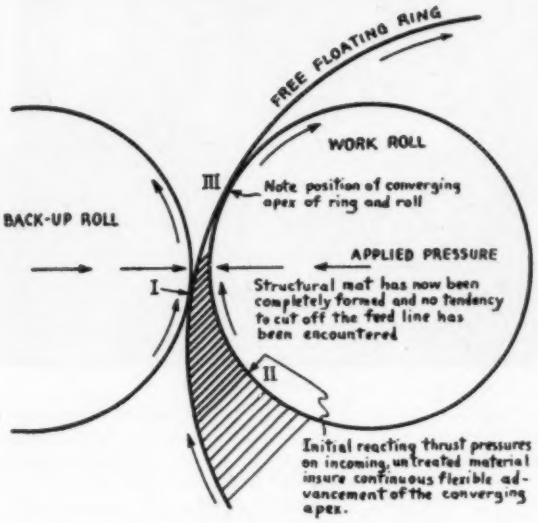
The Stacom press or "Stacomizer" (patents and trade-mark fully protected) was developed by Stacom Industries, Inc., Long Island City 1, New York, and is a continuous-feed, roller-type hydraulic press wherein the pressing is accomplished between a roll and the inner surface of a floating ring which surrounds the roll. It consists of three rotating members: (1) the back-up roll which is driven and turned in a fixed position, (2) the work-roll which is also driven but may be moved hydraulically in a fixed plane either toward or away from the back-up roll, and (3) the floating ring which rotates freely between the two rolls.

Material to be processed is fed into the lower part of the floating ring and is carried upward into the horn shaped angle formed by the outside surface of the work-roll and the inner surface of the floating ring. As the material comes under pressure, the floating ring dips and, acting as a lever, forces the rolls apart and at the same time opens up the throat of the angle by advancing its apex above the horizontal plane of applied pressure, thus eliminating the fixed angle inherent in conventional roll mill assemblies. By its action, the material is compressed and rolled through without shear or grinder action. Extracted fluids flow by gravity from the bottom of the floating ring and the dewatered material is removed from the work-roll and the floating ring by scrapers or doctor blades into the trough of a screw conveyor.

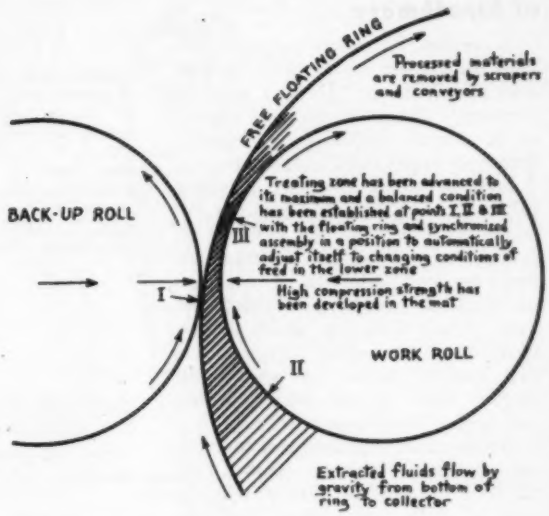
A unique feature of this press is that the material passes between a roll and the floating ring instead of between two rolls. This arrangement provides a long tapering angle leading into the nip which makes it possible to apply considerable greater pressures to the nip without causing the feed to pinch off as would be the case in an ordinary roll press. When the mill is operating there is a continuous flow of material passing into the pressure zone of this machine. After the forces of compression have broken some of the bonds holding the material in its original form, the applied pressure is suddenly released. This action tends to fibrillate woody material and leave it in a porous state.

The full-scale press employed at the Anglo-Canadian mill has two 30-inch diameter rolls of 40-inch face width, and a ring of 60-inches inside diameter. The work-roll is hydraulically loaded and the unit is designed for pressures up to 15,000 lb. per inch of width. The press drive consists of a bull gear joined by a flexible square shaft connection directly to the work-roll. The pinion of this bull gear is driven by the output shaft of a gear reducer which was designed for direct connection to a motor. In order to permit experimental runs of the press at various speeds, a V-belt drive was added between the motor and gear reducer with interchangeable pulleys to give three different speeds. The drive was designed for 150 hp. and for surface speeds on the inner roll of 36, 54 and 77 fpm.

Hydraulic loading pressure is provided by a hydraulic multiplier having controllable air pressure on the top end of a large piston and multiplied oil pressure on the smaller opposite end of the piston. This hydraulic pressure is applied to the loading pistons of the press and a uniform nip pressure is maintained irrespective of the varying


FREE FLOATING RING
WORK ROLL
III
Note position of converging apex of ring and roll
BACK-UP ROLL
APPLIED PRESSURE
I
Structural mat has now been completely formed and no tendency to cut off the feed line has been encountered
II
Initial reacting thrust pressures on incoming, untreated material insure continuous flexible advancement of the converging apex.

2. Position of roll assembly as material advances


FREE FLOATING RING
Processed materials are removed by scrapers and conveyors
Treating zone has been advanced to its maximum and a balanced condition has been established at points I, II & III with the floating ring and synchronized assembly in a position to automatically adjust itself to changing conditions of feed in the lower zone
BACK-UP ROLL
III
I
High compression strength has been developed in the mat
WORK ROLL
II
Extracted fluids flow by gravity from bottom of ring to collector

3. Position of roll assembly in full operation

position of the rolls. Air loading pressure is supplied by a small air compressor having an adjustable operating pressure and a reducing valve to supply the air side of the multiplier. The pressed bark is removed from the press by a system of doctors on both rings and roll which direct the bark into a screw conveyor. The machine was built for Stacom Industries, Inc. by Farrel-Birmingham Company, Inc., Ansonia, Conn.

Test Results

During the first tests at Anglo-Canadian, the press was operated with smooth surfaces on both ring and rolls. However, throughput rates were considered too low so further tests employed a work-roll and floating ring which had meshing circumferential grooving together with rows of non-meshing angular transverse grooves. This resulted in improved throughputs but also increased the moisture content of the product. Variations in the configuration of the grooves is expected to improve moisture extraction without decreasing the throughput.

One typical test run gave the results shown in the accompanying table. Where slippery bark was pressed, however, the throughput was lessened and moisture increased.

Pressure lb./in. width	Power Input kw.	Moisture per cent BD	Tons Per Hour
6600	64	54.9	3.25
7900	60	54.6	2.46
7900	70	55.1	2.79
7900	72	52.6	3.41
10500	84	51.5	2.61

At all pressures over about 4,000 lb. per inch of width, the disintegration of bark and bits of wood was such that no hog would be required to prepare the product for conveying by screws, belt, or blower, or to prepare for burning. The screw conveyor which is a part of the press itself gave no trouble whatsoever even when the press was operating at low pressure and disintegration was not complete. It is worth noting also that there is no need to sort out ends of broken wood, small sticks, etc., which may come from the drum. These are reduced to match stick diameters as a matter of course. It will be necessary to use a magnetic separator to remove rivets and other tramp iron if damage to the roll and floating ring is to be prevented.

Other Applications

During the period when the large-scale Stacomizer was in operation, practically all efforts were concentrated on the dewatering of bark. However, it appeared that this press potentially had many additional applications in the pulp and paper industry. The "floating" horn angle enables material to feed which is rejected by the conventional type of roll press. Many of these other materials have a greater coefficient of friction than bark and also give up their water more freely, with the result that the capacity of the unit is considerably greater than when treating bark. The potential applications include almost all processes which require a high degree of separation of solid material from liquid, or where a defibering action is desired.

Some of the potential applications suggested for the pulp and paper industry are: (1) Preparation of wood chips for rapid cooking. It has been demonstrated that the press will fibrillate wood waste or chips so that the surface exposed to pulping liquors is greatly increased. This may be of particular interest in continuous pulping or defibering processes where reaction time is limited. (2) Preparation of wood for the manufacture of sulphite pulp which may be used for the manufacture of viscose and soft papers or tissues. (3) Treatment of semi-chemical pulps in order to defiber the product. (4) Defibering of knots in screen rejects. (5) Dewatering of pulp for processes which require very high consistencies (e.g. 50 per cent). (6) Removal of processing liquors from chips and pulp, e.g., the removal of hydrolysate in the prehydrolysis process. This would have significance for almost any of the two-stage pulping processes. (7) Removal of juices and extracts from leaves, needles, bark and wood. (8) Treatment of bark and wood waste for further processing into useful material, e.g., humus, briquettes, wood flour, etc.

Much of the information in this article was included in a paper entitled "The Stacom Continuous Roller Press" presented at the annual meeting of the Technical Section of the Canadian Pulp & Paper Association, Montreal, P. Q., January 25-27, 1950. Authors of this paper were R. J. Chambers, assistant chief engineer, Anglo-Canadian Pulp & Paper Mills, Ltd., Quebec, P. Q., and K. C. Logan, director of development, Northeastern Paper Products, Ltd., Quebec, P. Q.

Education Plan Pays Off at Strathmore

A quality education program has been inaugurated in the West Springfield and Woronoco (Mass.) mills of Strathmore Paper Co. which is intended to educate employees to produce even finer paper than heretofore.

Each month the company is awarding a $50 U.S. Savings Bond to the employee submitting the best slogan concerning quality; winning slogans are made up into posters to be displayed on bulletin boards throughout the mills. Frank Golansky, power department, West Springfield mill, won the first months contest, in which 139 slogans were entered, with "Quality our Guide—Perfection our Goal."

Additionally, Strathmore is conducting an essay contest on quality. Five $100 U.S. Savings Bonds will be awarded before the contest closes on January 31, 1950.

As a further step toward quality improvement, the services of a consultant in statistical quality control have been engaged. This consultant is making a study of operations throughout the company mills and has also been meeting with groups of employees to educate them on quality control methods.

Frank Golansky (left) of Strathmore's Power Dept., West Springfield, receives $50 U.S. Savings Bond from C. M. Bryan, vice pres. in charge of production, for prize-winning slogan

Appleford Paper Prods. Occupies New Plant

Appleford Paper Products, Ltd., recently completed and took occupancy of its new plant at East Hamilton, Ont., Canada. The 66,000 sq. ft. plant, part of which is two stories high, is constructed of steel and brick on seven acres of land purchased in 1946.

The Appleford firm, a subsidiary of Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich., plans to add several new products to its waxed paper lines. The new plant employs about 250 workers.

Rhinelander Considers Larger Production of Pulp in Canada

A modernization program was approved by stockholders of the Rhinelander Paper Co., Rhinelander, Wis., at the annual meeting. This plan includes the complete rebuilding of one of the company's older paper machines and the installation of a new 12,500-kw. steam turbine.

Regarding reports that the company proposes to transfer most of its pulp production from Rhinelander to Canada, Folke Becker, company president, states that for the past year the company has had one digester in production at the plant of Great Lakes Paper Co., Ltd., Fort William, Ontario. Mr. Becker further states that the company is considering additional production at the Great Lakes plant, which eventually may result in a reduction of pulp production at Rhinelander. The company is considering this step principally because of the ever-mounting cost of transporting pulpwood, most of which comes from Canada.

CONSTRUCTION HAS begun by Canadian International Paper Co., Montreal, P. Q., Canada, on a $1,000,000 expansion of its bleached sulphite pulp and cellulose mill in Hawkesbury, Ontario, Canada. The project includes a new filter building, sedimentation basins, and underground mixing tanks reinforced with concrete and brick.

Container Corp.'s Subsidiary To Have Plant in Portland

A plant will be established in Portland, Ore., by Container Corporation of America, through its subsidiary, California Container Corp. The new property will produce both folding cartons and corrugated shipping containers. The first combined operation of its kind in Oregon, the plant will employ approximately 100 people when completed.

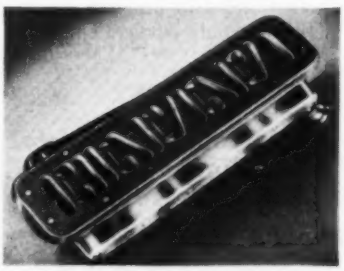
Acquisition of property and installation of equipemnt is expected to require about a year. Folding carton production now carried out at property leased from Columbia Paper Box Co. will be transferred to the new site.

TWO PAID HOLIDAYS, Christmas and the Fourth of July, have been granted hourly employees of Nekoosa-Edwards Paper Co. at Port Edwards and Nekoosa with the completion of union-management negotiations. The terms of the contract, to be in effect through May 31, 1950, allow the benefit to employees on company pay rolls for 60 consecutive days prior to the holiday, if the regularly scheduled shift prior to and following the holiday is worked, unless prevented by reason of necessary

Breakfast Pep Gathering

An intensive series of merchant meetings has been started by the Gilbert Paper Company, Menasha, Wis., to better acquaint fine-paper salesmen with the advantages of its quality papers. The meeting shown was with the Stanford Paper Company group at breakfast in the Congressional Hotel, Washington, D.C. The conclave was headed by George W. Griffin (standing), Gilbert's New York City manager. At his immediate right is C. J. Armacost, manager of Stanford Paper Co. fine paper department. R. A. DeWeir, vice pres. of Stanford, is to the right of the Gilbert easel.

This IS NO TIME TO LIMP ALONG WITH DIRTY, CLOGGED-UP PRESS FELTS



THE "JORDAN" TYPE CONDITIONER BOX

Mill after mill is replacing regular Conditioner shoes with this new type. It permits double the vacuum without wrinkling the felt. It's ideal for high speed machines.

Mid-week shutdowns to wash clogged felts are too expensive to tolerate today.

The Vickery Felt Conditioner keeps every inch of the felt clean and absorbent — in condition to do its best work continuously. Many users say felt life is substantially increased.

Now is the time to reap the benefit of conditioned felts. A lot of mills are putting them in.

May we make recommendations?

BIRD MACHINE COMPANY

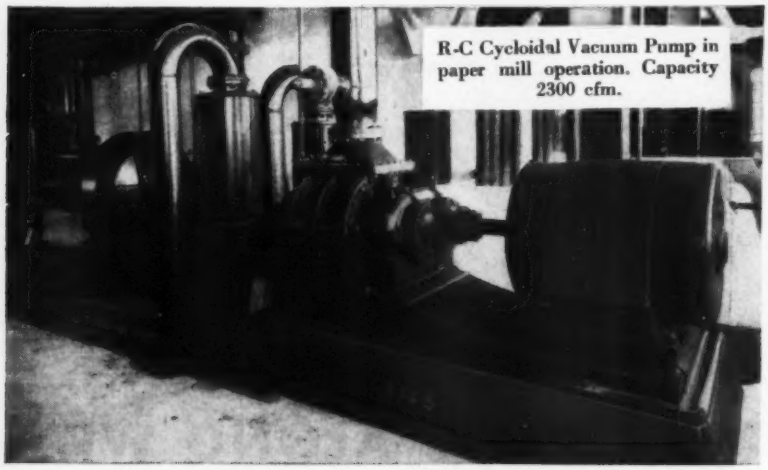
SOUTH WALPOLE • MASSACHUSETTS

absence as defined in the contract, on condition that employees shall not have refused to work, having been requested to do so.

AN UNUSUALLY WARM AND snowless winter in Canada has made it virtually impossible to remove harvested pulpwood over the country's soft and muddy roads to Dexter Sulphite Pulp & Paper Co., Dexter, N.Y. The company has been unable to build up its usual wood pile at Dexter, and production at the mill has been very low, although the condition should be remedied soon.

TWO BOULDERS CRASHED through the roof of a power house January 27 at the Weyerhaeuser pulp division plant, Longview, Wash., damaging two waste liquor lines and a large air compressor, when a misdirected blast at a rock quarry nearby went awry. No one was injured.

HEAVY SNOW FALLING over the Pacific Northwest in mid-January proved a hardship to pulp and paper operators of the territory. Several mills were forced to shut down briefly because travel conditions were so hazardous for employees, and roads and yards were impassable. Logging operations generally were halted, with some operations being down for as long as three weeks.



R-C Cycloidal Vacuum Pump in paper mill operation. Capacity 2300 cfm.

MAY WE ASSIST YOU, SIR?

If you're on a merry-go-round about vacuum pumps, ask ROOTS-CONNERSVILLE to settle things for you.

Our wide line of Cycloidal Vacuum Pumps, built especially for paper mills, offers a choice of standard sizes, all with these important advantages in economy and dependability:

High volumetric efficiencies—accurately maintained clearances, effectively sealed by water, insure high efficiencies; air being handled can be dry, or contain vapors or liquids.

Low friction losses—due to no contact between impellers or impellers and casings.

Higher speeds—permitting direct connection to standard motors, saving first cost, space and weight.

Flexibility—to meet varying vacuum requirements; suction automatically created to overcome resistance in system.

Durability and dependability—simplified design and construction for long-time, attention-free operation.

Tell us your requirements and we'll help find the answer closely fitted to your specific needs.

ROOTS-CONNERSVILLE BLOWER CORPORATION
502 Monroe Avenue, Connersville, Indiana

ROOTS-CONNERSVILLE

BLOWER BUILDERS SINCE 1854

ONE OF THE DRESSER INDUSTRIES

New York and Pa. Co. Contracts for Soda Recovery Plant

A new soda recovery plant will be built for the Johnsonburg, Pa., paper mill of New York and Pennsylvania Co. by Rust Engineering Co., Pittsburgh.

The contract calls for the design and installation of a soda recovery plant capable of producing 150 tons per day, with a soda recovery boiler to be fired with black liquor from the pulp processing. The Rust Co. is also contracted to construct a 6 or 7 story building of frame, brick, and tile, 40 x 70 feet, to house the boiler.

Weyerhaeuser's Everett Mill Workers May Get Pension Plan

Pulp and paper workers employed by Weyerhaeuser Timber Co., Everett, Wash., would be included if an employer-paid pension fund discussed for the company's 9,000 employees working in Washington and Oregon is settled upon.

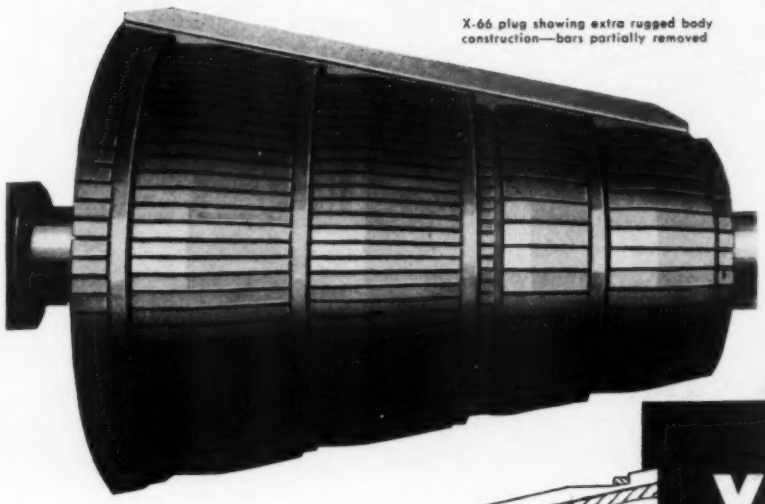
A pension program is being discussed by company officials with unions in its various plants. Since salaried employees are already covered by an employer-paid program, present plans include only workers employed on an hourly rate.

Contract for Alberta Mill Signed by R. O. Sweezey

A contract has been drawn up between R. O. Sweezey of Montreal, Canada, for the Edmonton Pulp and Paper Mills, Ltd., and the Alberta, Canada, government for construction of a paper mill to be built on the banks of the North Saskatchewan River east of Alberta. *(Cf. P.I. and P.W., Dec., 1949)*

Under the terms of the agreement, construction must begin by July 1, 1950, and be completed not later than December 31, 1951.

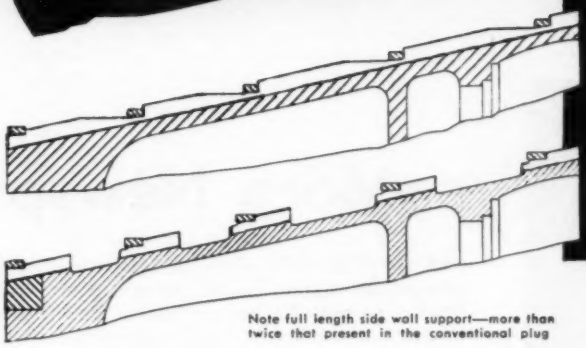
The company holds timber rights to certain types of trees on 1,500 sq. mi. of Alberta timber lands. The government will designate which areas the company may cut for the new mill, which is to have a capacity output of 200 tons of paper daily.



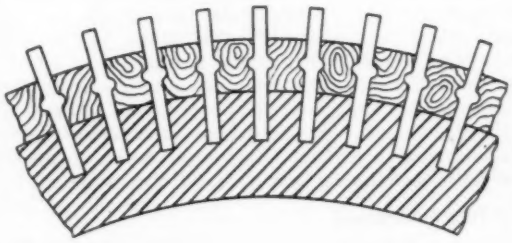
X-66 plug showing extra rugged body construction—bars partially removed

X-66 PLUG

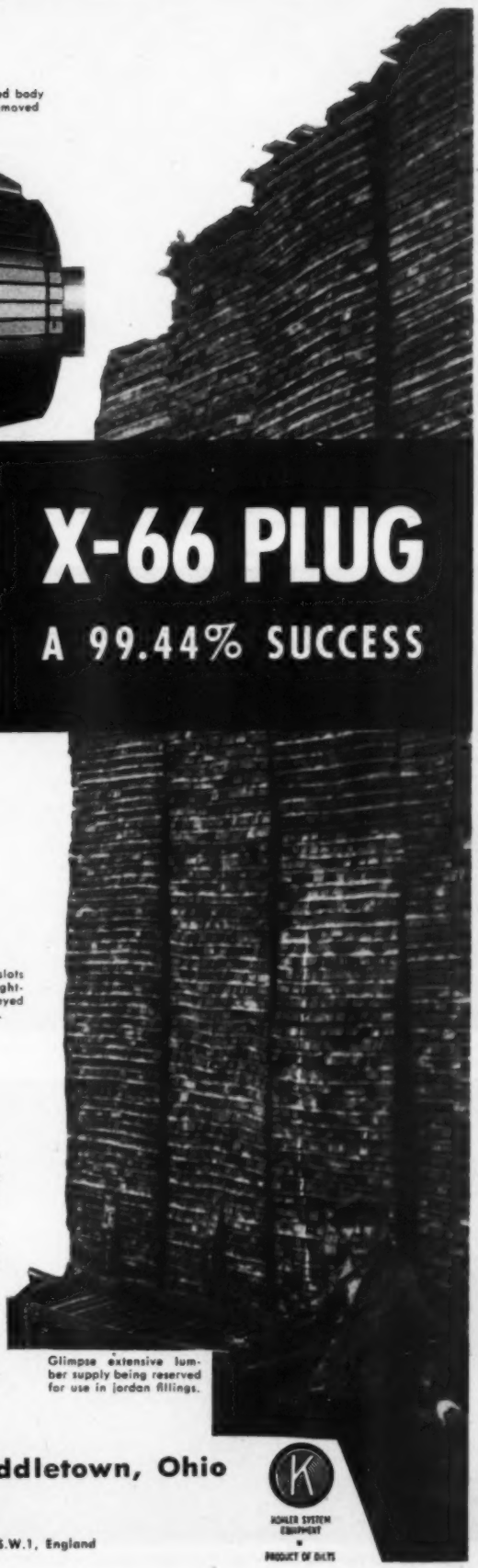
A 99.44% SUCCESS



Note full length side wall support—more than twice that present in the conventional plug



Note depth of metal slots and how the straight-grained woods are keyed between the bars.



Glimpse extensive lumber supply being reserved for use in jordan fillings.

The number sold draws near the thousand mark. The number that failed to deliver, only two or three. That's the performance record of the X-66 jordan plug—99.44% plus in any language.

X-66 plugs serve longer because they're built stronger—super rugged body construction—far greater bar support—1″ depth of bar buried in metal of the plug.

A size for any jordan. Your preference in bar width, bar arrangement and composition—steel, bronze, stainless, Monel—with bars tempered to degree of hardness preferred.

No mill gambles when it adopts the X-66. On the contrary it is playing a sure thing.

Technical Bulletin 91-S describes the X-66 in detail.

SHARTLE BROS. MACHINE CO. Middletown, Ohio

DILTS MACHINE WORKS, FULTON, NEW YORK
Divisions of THE BLACK-CLAWSON COMPANY, HAMILTON, OHIO
Western Sales Office: Mayer Bldg., Portland, Oregon
Subsidiary: B-C INTERNATIONAL, LTD., 16 Catherine Place, Victoria, London S.W.1, England
Associate: Alexander Fleck Ltd., Ottawa, Canada

KOHLER SYSTEM EQUIPMENT
PRODUCT OF DILTS

New Coosa River Newsprint Co. mill on 710 acre site adjacent to Alabama Ordnance Works near Childersburg, Ala.

A-C lime kiln; recovery plant and chip storage in background

One of the two 226 inch wide, high speed Beloit newsprint machines

More Newsprint

▶▶▶ IN MID-JANUARY, just twenty-one months after construction started, the No. 1 machine of the new Coosa River Newsprint Co. mill at Coosa Pines, Alabama, began turning out newsprint. Resulting from the untiring efforts of several public spirited groups, together with the enterprise and know-how of the Kimberly-Clark Corp., this new mill represents another forward step in the integrated utilization of the South's natural resources and manpower. It is the second newsprint mill in the South.

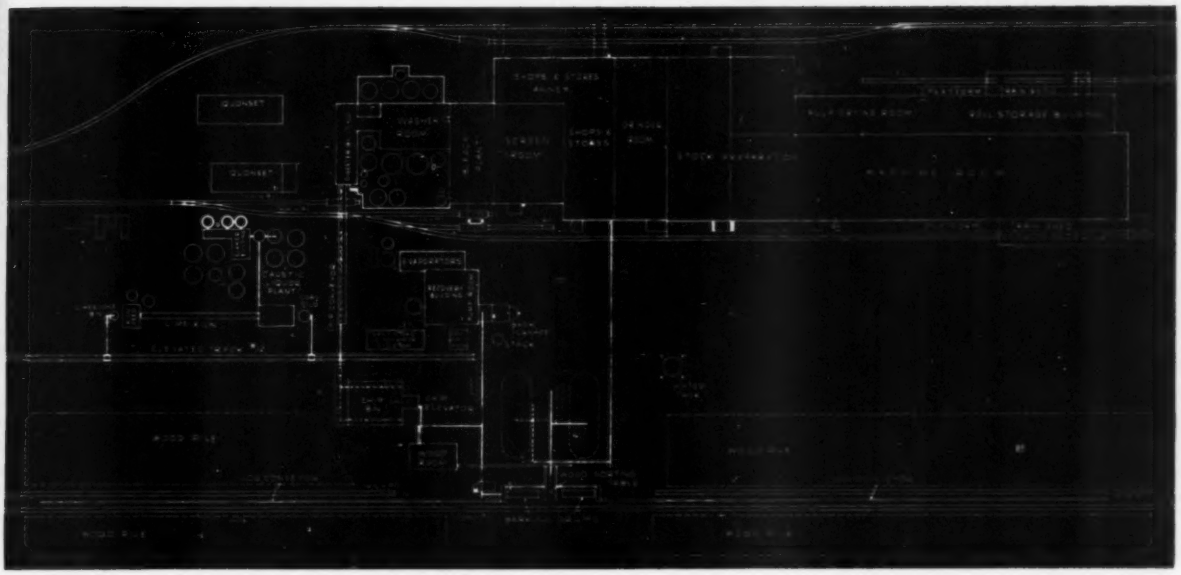
The new mill is designed to manufacture about 350 tons of newsprint per day from semibleached kraft and groundwood pulp, and 150 tons per day of dried fully bleached kraft pulp, providing about 750 permanent jobs and around 1,500 part-time seasonal jobs in woods operations.

Why This Location?

Natural resources were all favorable to the founding of a paper mill near Childersburg, Alabama. These included (1) an abundance of wood within a fifty mile radius, (2) a plentiful water supply from the Coosa River and (3) proximity to an abundant supply of fuel from the coal mines in Alabama.

In addition, a site was available at the Alabama Ordnance Works near Childersburg, whose 83,000,000 gallons per day water treating plant and 30,000 kw power plant could be utilized under a long term lease. Three railroads served this government plant and helped make this location attractive. Furthermore, the closing of the ordnance plant at the end of the war brought unemployment to hundreds of workers who might constitute the operating force of a new industry.

It was this prospect of unemployment and economic collapse after a period of wartime prosperity that sparked the Talladega County War Plants Reconversion Committee under the leadership of Donald Comer and Thomas W. Martin, to attempt a remedy for the situation. One of the first steps taken was to engage the J. E. Sirrine Company to survey the peacetime industrial possibilities of the ordnance plant. Following this study, recommendations were



Plan of the mill showing location of buildings, structures, tanks and process areas

for South — Coosa River Producing

made that it would be an excellent site for a newsprint mill.

Results of joint efforts by the Talladega County group, the Alabama Chamber of Commerce and the Newsprint Committee of the Southern Newspaper Publishers Association in promoting this new mill are now a matter of history. A site was purchased and negotiations were begun with the Kimberly-Clark Corp. Late in 1947 agreements were reached between the Coosa River Newsprint Co. and Kimberly-Clark under which the latter were to assume full responsibility for design and construction of the plant, for its operation and for the sale of its finished products.

Stock in the company is held by Kimberly-Clark Corp. and by 128 newspapers throughout the country, mainly in the South. Most of these newspapers have contracts for the purchase of its products.

Officers and Staff

Present directors of the Coosa River Newsprint Company are as follows: Stewart M. Chambers, Donald Comer, E. K. Gaylord, G. B. Hanson, Jr., John R. Kimberly, Ernst Mahler, Thomas W. Martin, Edward L. Norton, Cola G. Parker, Roy A. Roberts, John F. Tims, Jr., A. G. Wakeman, and Ralph M. Watt. Present officers are as follows: chairman of the board, Donald Comer; president, E. L. Norton; executive vice president and general manager, A. G. Wakeman; vice president in charge of sales, R. M. Watt; secretary, Walter Bouldin; treasurer, W. H. Clifford; assistant secretary-treasurer, P. A. Bachelder.

The Coosa River administrative group includes: A. G. Wakeman, executive vice president and general manager; Ralph M. Watt, vice president in charge of sales; W. W. Cross, sales manager; William E. Hornbeck, resident manager; and P. A. Bachelder, comptroller. John Raeburn is woodlands manager; C. C. Lande, plant engineer; M. D. Behnke, purchasing agent; Howard A. Neubauer, office manager; John Thurner, wood storage and preparation superintendent; James Moynihan, groundwood superintendent; J. D. Daily, pulp mill superintendent; Jay Crittenden, paper mill superintendent; James Simpson, service operations superintendent; G. A. DeCoudres, industrial engineering superintendent; Ernest Manders, technical superintendent; and G. R. Koons, personnel superintendent.

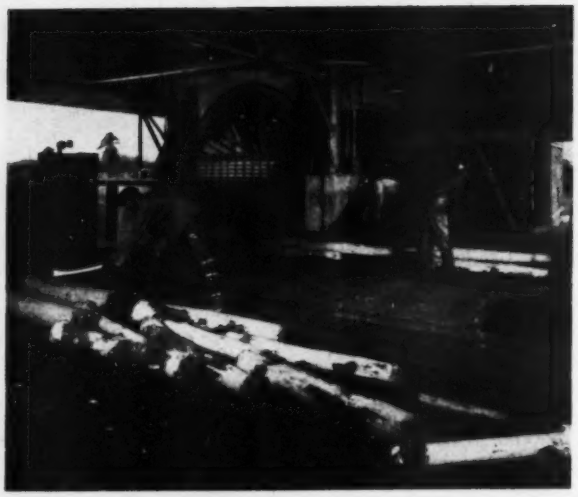
In addition to using its own engineering department for design of the mill, Kimberly-Clark has also made extensive use of its staff facilities in all other phases of plant operation. It has drawn on its other mills and offices to provide a nucleus organization at the new mill and made temporary assignments of staff specialists to aid in starting up the new plant. About 75 men from Kimberly-Clark, its subsidiaries and affiliated companies, were permanently assigned to the Coosa River Newsprint Co.

Design and Construction

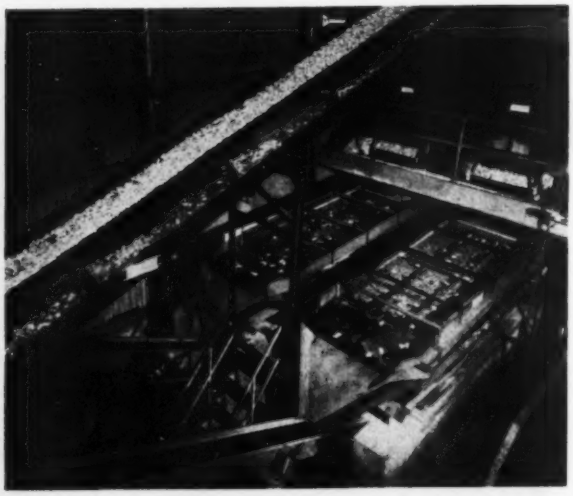
Construction of the mill was handled jointly by the Daniel Company, Greensville, S.C., and the F. H. McGraw Company of New York and Hartford. Design and engineering was handled by Kimberly-Clark's own engineering department and the J. E. Sirrine Company of Greensville, S.C., who had made the original survey. The construction project entailed the erection of numerous buildings and structures, the largest of which houses the paper machines and pulp dryer. The entire project required 45,000 cubic yards of concrete, 620,000 square feet of plywood concrete forms lined with Kimpreg, over 8,000 tons of structural and reinforcing steel, nearly 7,000 concrete piles, 250,000 square feet of roofing, and more than 1,000,000 bricks.

Subcontractors included the following: Industrial Piping, Inc., piping fabrication; Bagby Elevator and Electric Co., electrical installations; Brooks-Fisher Insulation Co., tank and pipe insulation; Hahn Roofing and Heating Co., installation of roofing and Transite siding.

One of the important features in the design and layout of this plant is that provision has been made for future expansion. In every department, space is available for installing the additional equipment or buildings that would be necessary if and when expansion were undertaken. By forethought and planning this new company has laid the groundwork for a permanent and progressive industry.



Wood sorting table between the barking drums



Chips are screened before going to storage

Chip reclaiming equipment on one of two chip bins

As a matter of policy, the company plans to purchase wood largely from farmers in this area, but to guarantee a steady wood supply the company has purchased and leased a considerable acreage. As a part of its operation, the company will have a forestry staff of 15 to 18 men, not only to care for its own holdings but to assist farmers in achieving the most effective methods of handling their timber crops. One of the first steps taken to assure a perpetual supply of wood was the setting out of about 200,000 seedling trees on company owned land early in 1949.

While the No. 1 paper machine is now turning out newsprint and the No. 2 machine expected to start soon, the sulphate pulp mill, bleach plant, and pulp drying machine have been operating since early December, 1949. Bulk of the dried bleached pulp output so far has been sent to Kimberly-Clark's Memphis plant for Kleenex and other products.

Estimated daily consumption of raw materials for this mill operating at design capacity are as follows: 707 cords of wood, 19 tons of limestone, 4 tons of burnt lime, 16 tons of salt cake, 2 tons of sulphur dioxide, 16 tons of chlorine, 7 tons of caustic soda, and 360 tons of coal. Water requirements are about 22 MGPD; 450,000 pounds per hour of 600 psi steam is generated, while 70,000 pounds per hour of 150 psi steam and 175,000 pounds of 50 psi steam are used in the mill. Excess power over and above that needed by the mill may be sold to the public utility companies.

Wood Preparation

Wood, in 5 ft. lengths, is brought to the mill by truck or railroad cars and may be unloaded direct to the storage piles or to the chain conveyors that feed the drum barkers. Trucks are loaded so that crane slings may be slipped around three cords at a time and lifted directly on to the storage pile. Two crawler-type cranes and one locomotive crane, using either slings or grapples, are employed for wood handling. About 20,000 cords of wood are stored at the plant.

The two Fibre Making Processes, Inc. drum barkers are arranged to discharge clean wood to a single sorting table. Incompletely barked wood may be recycled by conveyor back to the barkers. In general, the higher grade wood is used for grinding and is selected at the sorting table. This wood may be stored in a small reservoir area where it can be readily reclaimed when necessery. Separate incline chain conveyors take the wood to the groundwood mill and to the chippers. Each of these is equipped with a water spray to wash the wood.

Wood for the sulphate mill is chipped in a Murray 10-knife chipper, driven by an Allis-Chalmers motor and V-belt drive. Chips are then taken by belt conveyor to the chip screens made by the Orville Simpson Co. Oversized chips are returned to a hammermill-type rechipper while sawdust and fines are transferred to the conveyor which takes bark from under the drum barkers to the Babcock & Wilcox bark burning boiler. Fuel to the bark burner is measured by a Merrick Weightometer.

Chipper knives are sharpened with a Hanchett AK 112-inch Mammoth traveling wheel-head knife grinder.

Accepted chips from the screens are transferred by horizontal belt conveyors to a chip elevator which in turn discharges to a tripper conveyor that automatically distributes the chips into chip bins. Bins have a capacity sufficient to load about 20 digesters. Chips are reclaimed from the two bins by traveling screws which traverse the length of each bin, discharging onto rubber belts which in turn discharge onto an inclined belt conveyor. A Weightometer measures the chips which are transferred to the digester loading belt equipped with an automatic tripper to charge the digesters. The complete wood and chip handling systems, including conveyors, elevators, sorting table, etc., were supplied by the Link-Belt Co.

Sulphate Pulping

The sulphate pulp mill is divided into two sections from the digester room through the bleach plant and screen room so that semibleached pulp for newsprint is processed and handled entirely separate from the bleached pulp which is made for sale. Digesters were built by the A. O. Smith Co. These comprise two 3600 cf capacity steel digesters for making newsprint pulp, and four 3300 cf digesters for cooking the pulp to be fully bleached. Two blow tanks, each with a capacity of four digesters, receive the cooked pulp.

Digesters are charged with chips, white liquor and weak black liquor, and then cooked by direct steaming. Push button control of charging operations and of the Yarway blow valves on each of the digesters as well as the complete instrumentation of the cooking cycle, is an important feature of this installation. Steam to the digesters is automatically controlled by a time-cycle system. Instrumentation of digester operation is handled for the most part by Foxboro instruments.

Turpentine is recovered from the digester relief gases by first condensing and then separating crude turpentine from water condensate in a decanter. Heat in the blow gases is recovered in an accumulator. Both turpentine recovery system and accumulator were supplied by Fibre Making Processes, Inc.

Washing

The brown stock washing system was supplied by the Improved Paper Machinery Co. Two lines of three-stage washers with preknotters are employed. On the newsprint side, three 8 x 6 ft. washer drums are used, while on the bleached pulp side, three 8 x 10 ft. washers are used. Following each line of washers is a DeZurik regulator where consistency is adjusted before the brown stock drops to storage chests. Brown instruments are employed. Each line of washers has individual filtrate tanks for each stage, together with a foam tower and Impco centrifugal foam breaker. Washers are equipped with Reliance adjustable speed drives. Filtrate tanks, black liquor storage tanks and most of the other steel tanks used for processing and storage were supplied by Birmingham Tank Co. Div., Ingalls Iron Works Co.

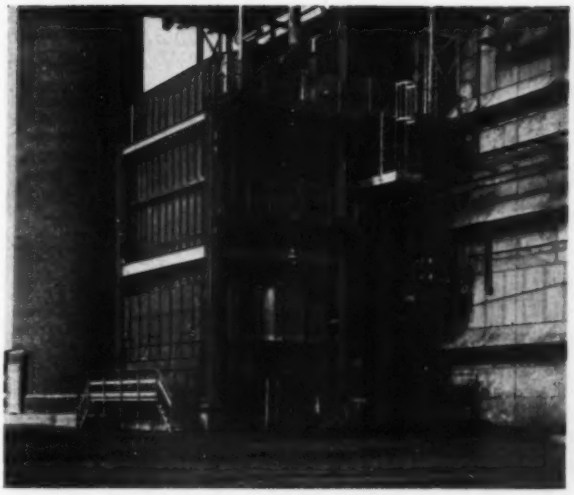
Screening

Washed brown stock is screened on three Impco rotary screens. Stock for newsprint is screened on rotary screens only, passes over a thickener and drops to a storage chest, from which it is pumped to the bleach plant. Stock for full bleaching is screened on rotary screens and after it is bleached passes over Impco flat screens. Rejects from the rotary screens are sent to a flat tailing screen. Magnus Metal Corp. furnished screen plates.

Chemical Recovery

Black liquor from the brown stock washers is pumped to storage and then to a six-body six-effect Swenson evaporator for concentration. Soap is separated from the black liquor after the third pass which helps eliminate soap fouling in the first and second effects of the evaporators. This crude soap may be sold as such or may be sent to the recovery furnace and burned. It is not permitted to leave with the effluent.

Heavy black liquor from the multiple effect evaporators is pumped to storage and then to the Murray cascade evaporator which discharges the liquor to the salt cake mixing tank. New salt cake from storage, together with dust recovered from the precipitator, is added to the concentrated black liquor. This liquor, containing salt cake, is pumped direct to the spray nozzles of the Combustion Engineering recovery furnace. Molten smelt collects at the bottom of the furnace and flows to the dissolver where it is dissolved in weak wash to form raw green liquor. Flue gas from the



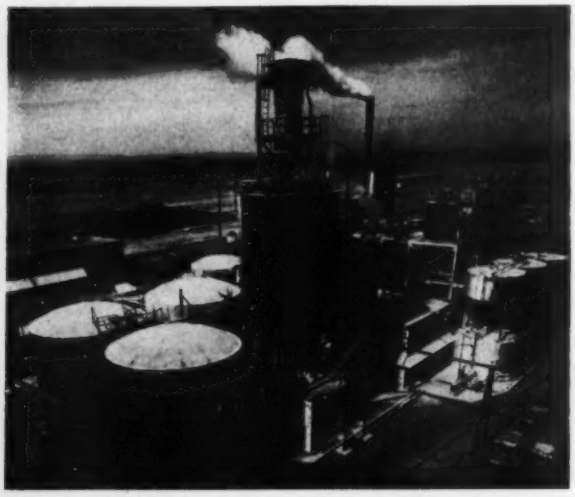
Bark and sawdust is burned in refuse furnace

Operating floor of digester building; note the control panels

Digesters are direct steamed; have electrically operated blow valves

Brown stock washers with control consoles and instrument panel

Blow tank (right), foam tower, and three filtrate tanks (rear)



Caustic area, lime storage tanks, bleach liquor system (right)

recovery furnace passes through the cascade evaporator and then to a Cottrell precipitator built by Research Corp. After the dust is removed by the precipitator the dust-free gas passes to the atmosphere through a Custodis built stack.

Liquor Making

Cooking liquor is made by the Dorr continuous causticizing and clarifying process. From the smelt dissolving tank under the recovery furnace, the raw green liquor is pumped to the causticizing plant and clarified. Both new and recovered lime is slaked with clarified green liquor and the slurry then passed through the causticizing tanks. The white liquor so formed is clarified and then pumped to a storage tank from which it is drawn for use in the digesters. Lime sludge is washed and sent to a Swenson lime mud filter. This vacuum filter discharges the mud to the lime kiln while the wash liquor is returned to storage.

Chemicals such as salt cake and lime are unloaded from railroad cars by means of Brady pneumatic conveyors. Salt cake is transferred from storage to the recovery building by the pneumatic conveyor system.

Lime Recovery

Lime sludge from the Swenson filter, together with pebble limestone, is calcined in 170 ft. x 8½ ft. x 9 ft. Allis-Chalmers two-support type rotary kiln. A Merrick Weigh-feeder measures the pebble limestone used. The kiln is motor driven with four speeds and has an auxiliary gasoline engine drive. An integral part of the installation is a Morgan Construction Co. gas producer which burns pulverized coal and delivers producer gas at high temperature direct to the burning zone in the kiln. Brown instruments are employed to control the producer gas unit and kiln operation. Temperature in the kiln is measured with a radiation pyrometer. Hot gases from the lime kiln pass through a scrubber where any dust is removed by the weak wash which is used in the scrubber.

Ashes from the gas producer are handled hydraulically through a pipeline type sluice system by means of jet pumps in a United Conveyor Corp. system. Ashes from the bark burning furnace are handled in the same manner. Feeding inlets are located in front of each of the cleanout doors and the different conveyor branches are connected to a single 8-inch discharge pipeline that transports the water and ashes to an ash sump or fill ground area located some distance from the plant. Dust from the collector hoppers of the bark burning furnace is removed pneumatically and discharged to an air separator. This dust is sluiced down with water and discharges through the same pipeline that handles the ashes.

Bleach Plant

Newsprint sulphate stock is bleached in three stages, namely, (1) low density chlorination, (2) high density caustic extraction, (3) high density hypochlorite bleaching.

Sulphate pulp for machine drying, however, is fully bleached in six stages as follows: (1) chlorination at low density, (2) caustic extraction at high density, (3) hypochlorite bleaching at high density, (4) caustic extraction at high density, (5) hypochlorite bleaching at low density, (6) SO_2 treatment at low density.

Bulk of the bleach plant equipment was supplied by Impco, variable speed washer drives were supplied by Reliance, while major instrumentation was handled by Brown. Chlorine gas and caustic solutions are metered with Fischer & Porter rotameters.

Fifty per cent caustic solution is received in tank cars and pumped to storage. It is diluted before being used in the caustic extraction stages of bleaching. Bleach liquor is made continuously by a single pass chlorination of lime and a subsequent settling of sludge and a washing. An Infilco

chemical feeder and lime slaker is employed. This operation takes place in the causticizing plant and the bleach liquor pumped to the bleach plant. Liquid SO_2 for use on the fully bleached pulp is received by tank car and is handled in a system supplied by the Virginia Smelting Co.

Bleached Pulp Drying

Bleached pulp is formed on an Impco feltless wet machine and the sheet dewatered by passing through an Impco press section. The wet sheet then goes into a multi-pass Flakt dryer built by Paper Machinery Ltd. Upon discharging from the enclosed drying chamber, the pulp is cut into sheets which are then transferred on a Matthews conveyor to the Baldwin press, where they are baled for shipping.

Groundwood Mill

Wood is ground on five Roberts grinders made by the Appleton Machine Co., each of which is driven by a 3500 hp, 11,000-v synchronous Allis-Chalmers motor. Artificial abrasive stones for these grinders were supplied by Norton and Carborundum. Temperature controllers were supplied by Taylor and consistency regulators were furnished by Trimbey and Askania.

From the grinders the stock passes over an Allis-Chalmers vibrating type coarse screen before going to the four Cowan centrifugal pulp screens made by Montague Machine Co. Screen rejects are pumped to three Haug drainers which discharge to three Bauer refiners where the screenings are disintegrated.

After screening, groundwood stock passes to a battery of Nichols Vortraps. Ten primary 10-inch rubber lined Vortraps discharge thoroughly cleaned stock while rejects from the primary Vortraps are passed through three 4-inch rubber lined secondary units. The Vortrap system eliminates grit and other foreign material present in the pulp. From the Vortraps the cleaned dilute stock is pumped to five 8 x 16 ft. Oliver deckers. The decker vats are stainless steel lined while the drums are rubber covered.

Newsprint Stock Preparation

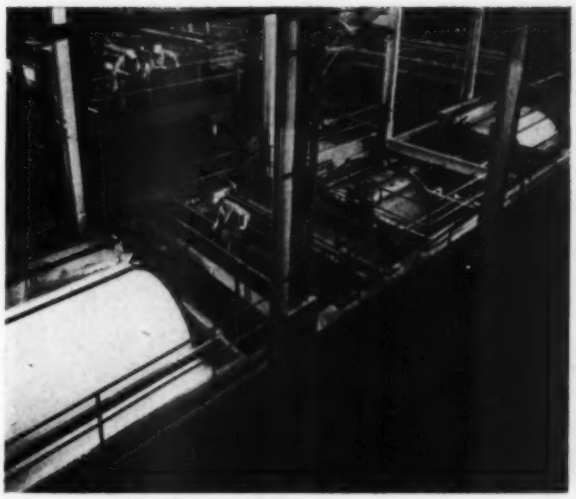
For each of the two newsprint machines, stock is supplied by two separate Fischer & Porter stock proportioning systems. Here, sulphate pulp, groundwood pulp, broke and alum are proportioned with a 4-way ratio control system. The mixture of the three kinds of stock goes to a mixed stock chest and alum added at the paper machine chest.

Mixed stock for the two machines is refined in six Morden Stockmakers and two E. D. Jones & Sons jordans, with stainless steel plugs and fillings. From the machine chests stock for each machine is pumped through two tickler refiners before going to the fan pumps.

The fan pump of each machine delivers stock to four No. 3-A Bird screens with 20-cut plates. These screens discharge by gravity to the headbox of each Beloit paper machine fourdrinier.

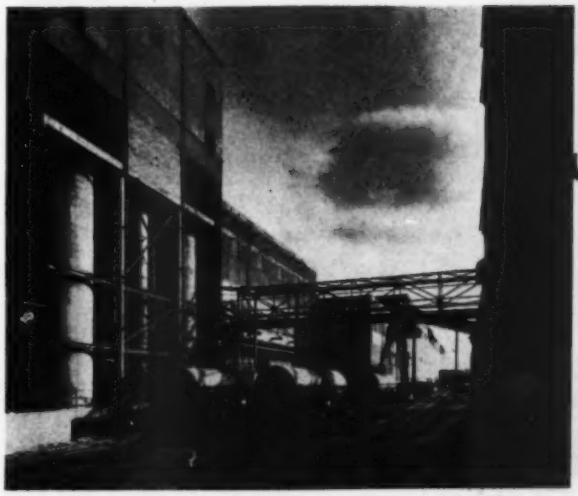
Paper Machines

The two Beloit paper machines are identical except one is right hand and the other left hand. Each machine is 226-inches wide with a wire length of 100½ ft. A stainless steel lined distributor, headbox and slice of special design, complete with motor operated rectifier rolls and slice lift, delivers stock to the wire. The fourdrinier is level and all main beams are covered with stainless steel. Breast roll and all table rolls are mounted in anti-friction bearings. White water trays are stainless steel and the six flat boxes are built of stainless steel with wooden covers. Each machine is equipped with a 42-inch suction couch with double suction boxes, a dandy roll and a rubber covered lump breaker roll. Water is extracted in two suction presses with 36-inch diameter rubber covered bottom rolls, and 36-inch diameter granite top rolls.

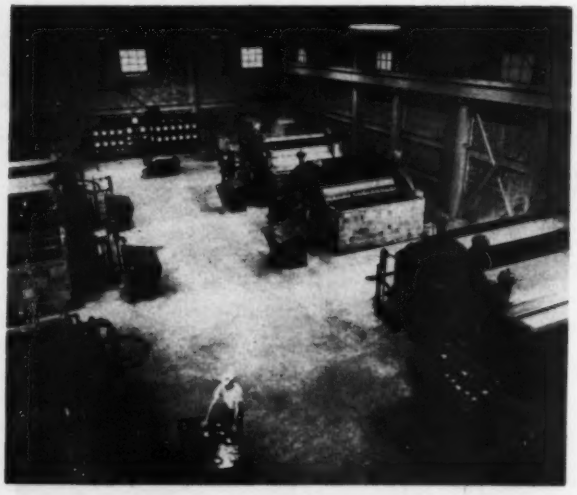


Screen room showing vacuum deckers

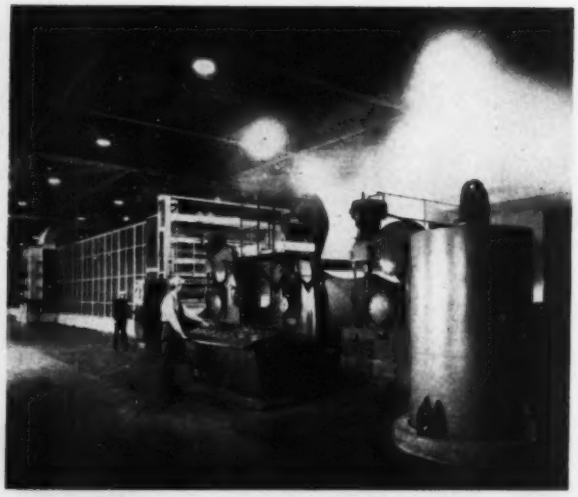
Flat screens for bleached pulp



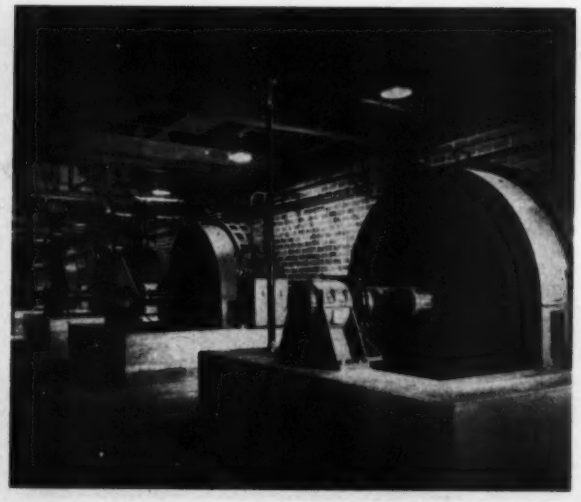
Chlorine cars and bleaching towers; note open construction



Bleach plant operating floor and instrument panels



Wet machine and Flakt dryer for bleached pulp



Five 3500 hp synchronous motors drive the Roberts grinders

Six Nash pumps driven in pairs by three 400-hp synchronous Allis-Chalmers motors provide vacuum for the suction boxes, suction couch, and the two suction presses for each machine. The dryer section for each machine consists of fifty-four 60-inch diameter paper dryers and ten 48-inch diameter felt dryers. It is divided into three sections with a top and bottom dryer canvas for each section. Felts are guided by air operated diaphragm guides. Lodding oscillating doctors are used. Steam is supplied to the three sections with temperature and differential control handled by Brown instruments.

Each machine is equipped with an 11-roll open side calender stack with a 34-inch diameter bottom roll, 20-inch second roll and 16-inch intermediate rolls. These are equipped with Vickery doctors.

Dryer gears are fully enclosed and the paper machine is lubricated with a Bowser oiling system. Each paper machine is equipped with a separate lubrication system, which consists mainly of a precipitation tank and filtering-clean-oil tank, together with pumps, pressure tank, automatic controls and other accessories. A Midwest-Fulton vapor circulating and steam control system handles the condensate and flash stem from the dryers.

From the calender stacks the paper is wound into jumbo rolls on an automatic air-operated Beloit reel. The jumbo rolls are unwound, slit, and rewound on a Beloit winder equipped with a shaft puller for removing the newsprint rolls from the winder shaft. A Langston rewinder is used for rewinding rolls in the finishing department.

Broke from each machine is repulped in a Jones Liebeck disintegrator. After being pulped it passes through two Emerson jordans and is thickened on Oliver thickeners. Paper machine rolls are maintained with a Farrel-Birmingham roll grinder. Suction box covers are kept in good condition by Eastwood-Nealley conditioners.

Paper Machine Drives

Paper machine drives and winder drives were supplied by General Electric Co. Falk gear reduction sets were employed on the drives. The two paper machines use multiple generator sectional drives with electronic-amplidyne regulators designed to operate at a top speed of 1800 fpm. Each of the six sections—couch, first and second press, three-section dryer, calender, and reel—is mechanically independent of all other units but electrically coordinated.

Each of the two adjustable speed winder drives with regenerative tension control consists of a double motor drive designed for 4,000 fpm top speed. A braking generator on the unwind stand is used to provide the regenerative tension and assist the main generator in supplying power to the driving motors. The winder drive is amplidyne controlled and is capable of maintaining any desired tension at all times during run, acceleration and deceleration.

Heating and Ventilating

In the ventilation of modern machine rooms the comfort of the workmen during hot weather in the summer is deserving of consideration, and in the Coosa River Mill this matter has been given more careful attention probably than ever before. Complete heating and ventilating systems for the entire mill were supplied by J. O. Ross Engineering Co.

For summer ventilation it is necessary that the air be delivered at the working level to provide relatively cool, dry air in the working zone and to give the proper degree of air movement. This requirement is met in a unique manner by having two special summer ventilating supply units on the mezzanine at the rear of each machine discharging into a duct at each end of the paper machine hood. This duct runs along the top of the paper machine hood and is designed to tie into the hood construction and to harmonize in appearance with the hood. Air is projected from this duct

down inside the front curtain and diffused into the aisle.

Both supply and exhaust equipment is placed on mezzanine floors at the rear of the machines with the supply air handling equipment taking air from outdoors through plenum chambers and hooded intakes located on a second mezzanine floor at the dry end and wet end of each machine.

The calender stacks on both machines are equipped with calender cooling systems and the re-winders are equipped with trim conveying systems. The trim is taken through the trim blowers and discharged into the re-pulpers. Both paper machines are equipped with Ross-Grewin systems.

Man cooler units for spot cooling and ventilation are located in the mixing room, between the head boxes of the paper machines and at the cutter in the pulp dryer room.

Hoods are installed over the brown stock washers. All hoods for these washers as well as for the paper machines are of Transite and steel construction.

Equipment

Although many of the equipment installations have been mentioned in the foregoing paragraphs, a good many more are equally important. A few of them are listed here.

Tanks and Chests—Stebbins Engineering & Mfg. Co. installed the tile tanks and stock chests in the mill as well as the lining of concrete tanks, bleach towers, wire and couch pits and other stock handling equipment that required tile lining. Kalamazoo Tank and Silo Co. built the wooden vessels such as flowboxes, headboxes, stock troughs, etc. Birmingham Tank Co. Div. of Ingalls Iron Works fabricated most of the steel tanks. Chicago Bridge and Iron Co. supplied the elevated water tank.

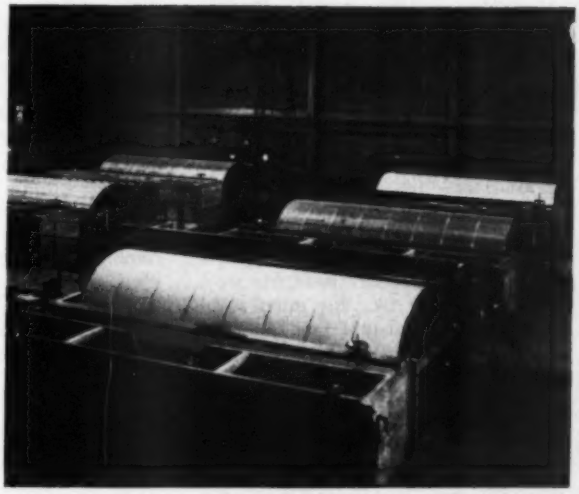
Pumps—About 250 pumps of various kinds are used in the mill. Most of these were supplied by Allis-Chalmers Mfg. Co., Goulds Pumps, Inc., Bingham Pump Co., and Worthington Pump and Machinery Co. Included were pumps built by Morris Machine Works, The Duriron Co., Viking Pump Co., DeLaval Steam Turbine Co., Porto Pumps, Inc., and others. Nash Engineering Co. supplied vacuum pumps while air compressors were furnished by Chicago Pneumatic Tool Co. and Ingersoll-Rand Co.

Materials Handling—Conveyors were supplied by Link-Belt Co., Jeffrey Mfg. Co., Brady Conveyor Co., Matthews Conveyor Co., Engineering Products Co., United Conveyor Corp., M & H Equipment Co. Cranes and hoists were furnished by Whiting Corp., American Hoist and Derrick Co., Manitowac Engineering Works, Orton Crane & Shovel Co., Northern Engineering Works, Harnischfeger Corp., Manning Maxwell & Moore, Inc. Industrial trucks were supplied by Clark Equipment Co. and Hayes Machine & Mfg. Co., Inc. Owen Bucket Co. and Blaw Knox Co. supplied pulpwood grapples.

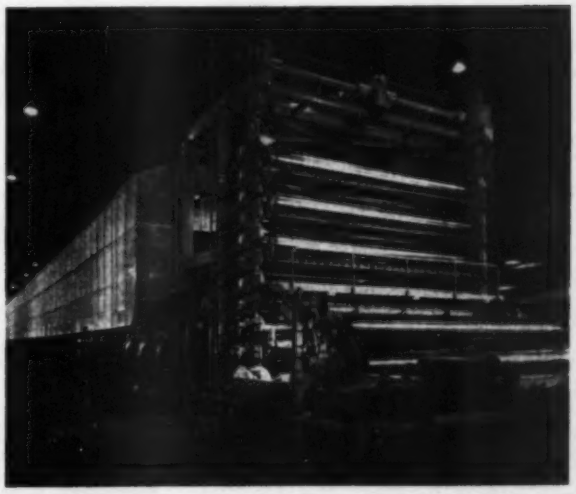
Instruments and Controls—One of the outstanding features of this mill is the extensive application of instruments and control systems to measure and control or regulate many of the variables in mill operation. Temperature, pressure pH, conductivity, liquid level, solids level, consistency, weight and flow are among the many variables measured, recorded or controlled. Consistency regulators were supplied by the DeZurik Shower Co., Trimbey Machine Works and Askania Regulator Co. Instruments and/or control systems were supplied by the Brown Instrument Co., The Foxboro Co., Bristol Co., Fischer & Porter Co., Bailey Meter Co., Taylor Instrument Co., Hays Corp., Leeds and Northrup Co., Esterline Angus Co., The Bin-Dicator Co., Northern Equipment Co., Republic Flow Meter Co., Fischer Governor Co., Moore Products Co., Leahy Co., Mec-Tric Control Co.

Acknowledgment is made to the Kimberly-Clark Corp. and Coosa River Newsprint Co., who provided the information and illustrations presented in this article. Pictures were taken by Hedrich-Blessing, Chicago.

Vortraps remove grit and dirt from screened groundwood



Five vacuum deckers for groundwood pulp



Dry end of No. 1 paper machine; note air outlets on side of hood

Why Forest Management?

Insects and disease take an increasing toll of our timber crop. Such losses can be reduced by application of intelligent forest management.

T. F. McLINTOCK
NE Forest Experiment Station

▶▶▶ IN ALMOST ANY discussion of timber conservation the element of waste naturally receives a good deal of attention. The waste usually referred to is the tangible, visible material which piles up at saw mills, is left in the woods, or is the liquid residue from the manufacture of pulp. But I'd like to direct your attention to another type of waste which, while not anything you can see or smell, is probably much greater in the aggregate than the waste resulting from lumber and paper manufacture.

I should, however, like to suggest that the word "waste" is a bit harsh for our purpose. It implies a deliberate and knowing dissipation of the resource without regard to the consequences. Let's think of it in terms of *loss,* loss resulting from failure to realize utilization of material which could be available—loss which might, to a very great extent, be eliminated through the development of knowledge, skills and techniques.

Timber is a crop; it grows, matures, and is harvested like any other agricultural crop. And it differs from the other crops in two basic respects: In the time between sowing and harvest, and in its ability to regenerate itself. There is one more important difference, too, at least throughout most of the Northeast—and much of the rest of the country as well. It is this: Whereas the farmer applies to his farm a conscious and highly developed agricultural science or skill, the forest is, by and large, just allowed to grow, without the benefit of any conscious management other than fire protection.

The successful farmer generally harvests all his crop. The potato grower who leaves 100 bushels per acre to rot in the field is not a particularly good potato grower. Yet, according to the best estimates available for Maine, we are losing more than 90 million cubic feet of timber annually, without anyone ever putting an axe into a tree. This is equivalent to a third of what we actually produce.

Insects and Disease

Of course, some of this loss is due to fire, but not as much as you might think. Average yearly fire loss in Maine for the 10-year period 1934-43 was 2½ million cubic feet. Well, then, what happens to the rest of the 90 million feet that we lose every year? It is largely lost through the depredations of insects and the ravages of disease. I'm sure all of you have observed the widespread dying of our birch. This has resulted, at least in part, from the attacks of an insect. Our beech, too, is suffering heavy mortality, victim of a co-ordinated attack by an insect and a disease. Our fir, which is very susceptible to various types of decay, sustains losses running into thousands of cords annually. The trees are not killed outright, but the wood fibers are destroyed and the trees are rendered useless.

Similarly, the white pine weevil destroys the merchantability of millions of feet of potential pine sawlogs by repeated killing of the growing tip. Again, the pine is not killed, but trees become so deformed as to be of little commercial value. I could go on for some time listing the rusts, cankers, budworms, borers, beetles, sawflies and other such enemies of conservation. There, then, is the source of our annual loss of over 85 million cubic feet of cellulose. Even in the disastrous year of 1947, the fire loss did not exceed the loss sustained every year from insects and disease.

Overmaturity Invites Disease

What is the solution to this problem? Nearly all our forest pathologists and entomologists have been saying for years that epidemics can be controlled and rendered relatively harmless by the application of basic silvicultural principles, one of which is: Keep your forest vigorous and fast-growing—don't allow it to become overmature. Old trees not only decline with respect to their natural growth rate and become a financial liability, but they are also much more susceptible to insect-disease attacks than younger, more vigorous trees. They are, in a sense, potential breeding grounds for various forest pests, and as such may endanger the health of the entire forest community. I firmly believe that our birch problem would never have developed if the birch had not become overmature over hundreds of thousands of acres all at about the same time.

Similarly, the tremendous annual loss of decadent balsam fir is a direct result of overmaturity. Fir, a short-lived species, is ready to be out at 70 years of age, and at 80 the chances are better than 10 to 1 that it will be infected with one or more varieties of decay. If such trees are not harvested, the usable portion will shrink steadily, and sooner or later the tree will be so weakened that it will blow over. Throughout most of the spruce-fir land in Maine where there has been no cutting for 40 or 50 years much of the fir left following the last operation is now well over 100 years old. In such stands the annual loss of one large fir per acre per year is not uncommon, and this loss plus the gradual destruction of sound wood in trees still living more than offsets the annual growth on healthy trees.

I don't intend to imply that forest insects and diseases will not attack perfectly healthy, young trees. They will. But the recuperative potential of such trees usually enables them to overcome those attacks, unless they are simply overwhelmed by vast hordes which have built up on an old tree nearby.

Don't Cut Before Maturity

Obviously, the prevention in these cases is strict control over the forest, with close scrutiny of its condition and frequent enough cuts that trees will be removed before they become overmature.

But just as it is very poor business to allow your assets to disintegrate, so it is also poor business to liquidate them just when they are beginning to give you a substantial return on your investment. The failure of timberland owners and operators to recognize this fact accounts for annual "losses" of well over a hundred thousand cords of spruce and fir alone. Good agriculture recognizes that immature fruit and unripe grain are not ready for harvesting. Why, then, should not the same principle be applied to the timber crop?

Consider red spruce, for example. Under normal forest conditions it takes from 35 to 40 years to attain a height of five feet. By the time it is pulpwood size it is often 100 years old. One hundred years to get just big enough to cut! But by this time its crown has usually grown up into direct sunlight and it is able to compete successfully with adjacent larger trees. From then on it will grow at a much faster rate. Our studies have shown

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Adapted from a paper presented at the "Conference on Maine Resources and Their Development" held November 4, 1949, at the University of Maine, Orono, Maine. Mr. McLintock is located at the Penobscot Branch of the Northeastern Forest Experiment Station at Bangor, Maine.

that whereas the average 5-inch spruce requires 20 years to grow an inch in diameter, a 9-inch spruce will grow the same amount in half the time. Is it good forestry, or good sense, to cut a tree which, after 100 years, is just now beginning to earn its way? Is it good business to liquidate all merchantable material, if, by leaving the three or four lower merchantable diameter classes, you can maintain indefinitely an interest rate of better than 3 per cent, compounded?

Of almost equal importance is the fact that it costs more to convert small trees into lumber or paper than the end product is worth. We have at hand considerable data relative to the minimum economic size of sawlogs and pulpwood, and indications are that for the most part cutting limits are well below the break-even point.

Perhaps the most important source of loss in terms of long range conservation is failure of the timberland owner to capitalize on the potential producing capacity of his forest. Again we might consider the potato grower. If, under good farming practices, he should average nearly 400 bushels per acre but actually produces less than 200, he'd probably be considered guilty of gross mismanagement. Yet, from studies which the Northeastern Station has made, we know that, under management, our forests can be made to more than double their present yields. If we are actually growing—as estimates indicate—around 300 million cubic feet a year, we are, in a sense, "losing" another 300 million feet by failing to make the most of the producing capacity of our forest land.

And just what does it mean, this doubling the present rate of growth of our forests? It means very much the same thing as doubling yields would mean to a farmer. It means better stocking—more trees per acre; better composition—proper balance of the valuable species and elimination of the weed species; and it means better condition—faster growth and better form of all trees. It means in a word—or two words—forest management. Forest management to be applied with the same care and skill as the farmer applies agronomy or horticulture, or as the papermaker applies chemistry or engineering.

Forest Management

The basic requirement of forest management is strict control over stand structure and development. It is too much to expect that an intricate biological complex like a forest could automatically develop its optimum stand structure, especially after relatively indiscriminate cutting with no control or care, other than fire protection. Our forests generally have too few trees, too many trees, too many overmature trees, too many small trees, too little reproduction, too many weed species. The typical stand is an unorganized mass of trees growing into maturity in spite of what we do rather than because of it.

In applying management to a tract of forest we are dealing with very specific, distinct and sensitive elements. Some—soil fertility, drainage, site index, elevation, past treatment—cannot be controlled to any degree, but represent elements which influence the direction and intensity of our efforts. Their effect must be carefully calculated in advance and allowed for. Others—stand density, diameter or age, class distribution, composition, condition—can and must be controlled if the full productive capacity of the forest is to be realized.

For the most part actual control will be achieved by regulation of the cut. That is to say, by deciding what proportion of the growing stock, or capital, should be left after the cut in order to earn the highest possible rate of interest. This residual can be depended upon to increase its growth rate sharply because it will have more room—or less competition—and more favorable conditions in which to grow. The stimulated response to this release will not continue indefinitely, however, and here control becomes effective through adjustment of the elapsed time between cuts—the cutting cycle; the next cut should be carefully timed to come when the beneficial effect of the first has been dissipated. Under the present unorganized system, cutting cycles will run from 60 to 100 years. Under applied management with the forest producing at or near its maximum capacity, they should not exceed 20 years, and should probably average 10 years.

Practical Aspects

Up to this point I think most timberland owners and operators who have given forest management much serious consideration have been in general agreement with what I have said. Now, however, we have come to a parting of the ways. "To do as you recommend," they say, "is impractical because of the nature of our operations and the condition of our stands. To make such frequent cuts would send our operating costs sky-high. Our holdings aren't in good enough shape to start such a program. Furthermore, our company hasn't the trained personnel to carry it out even if we could afford it."

There is, I must admit, considerable justification to their protest. One of the first needs of a good forest management program is a good, permanent transportation system. We have to overcome the tremendous obstacle of economic inaccessibility before we can organize and manage efficiently the growing of timber on many of our wildland towns. Then too, much of our forest has been rather heavily cut and now supports only enough growing stock to permit application of a few basic forestry principles. There is another more fundamental justification, however, a more far-reaching obstacle in the way of immediate practice of intensive forest management.

Any intensive control measures which we, as a research organization, recommend, must not only have proven themselves capable of accomplishing the results for which they were intended, but they must also have proven themselves capable of repaying their investment and carrying costs plus interest. There can be no vague theorizing. Such proof in positive and undeniable terms is lacking.

Time for Action

The science of growing timber in our region, in Maine, is in its infancy. Our research thus far has served to give us valuable basic starting points. We have learned much about individual tree characteristics, and something of their behavior in communities. We have pretty well completed the "test-tube" stage of our research. What remains, and what we are now getting under way, is the "pilot-plant" stage. We are putting to test under actual operating conditions not only the efficacy of basic silvicultural theories and techniques, but also the financial aspects of managing a forest—the balancing of costs of production, including interest on forest capital and improvement measures, taxes and other charges, against increased returns resulting from better management.

Now I don't mean to say that a better job of management must wait until we know all the answers. We have a very substantial reservoir of technical knowledge which has not yet been used. There is plenty of good productive forest land readily accessible from permanent roads where our timberland owners could put this knowledge to work, at least on a trial basis. And it is gratifying to see that some of our biggest operators are gingerly dipping their toes into the cold, cold water of forest management, and finding after some reflection that they could probably go in up to their ankles without too much discomfort. Yields on small holdings—which by and large are in much worse condition and more badly in need of attention than industrial holdings—could be sharply increased by application of some of the basic

principles of good forestry which we have known for a long time.

The further development of a realistic and successful program of conservation of our forest resource requires, I believe—and I'm speaking very frankly—first, the expansion of research in the field of forest management by all interested agencies, federal, state and private. Second, it is essential that there be an increased realization on the part of industrial policy makers of the need to begin putting forest management as an active program into effect on their holdings; this realization must be accompanied by a willingness to finance the early stages of the program on the basis that it will more than pay off through increased returns in the future. And third, full development of the latent productivity of our forest lands requires an intensified educational program, coupled with adequate demonstration areas, aimed at selling the small woodlot owner on the idea of forest management.

Loss in Head on Pumping Fibrous Suspensions

D. S. DAVIS
Virginia Polytechnic Institute

▶▶▶ IN CONNECTION WITH a recent study of the viscosity of fibrous suspensions (*2*) it was shown that the loss in head on pumping such suspensions could be calculated from the expression

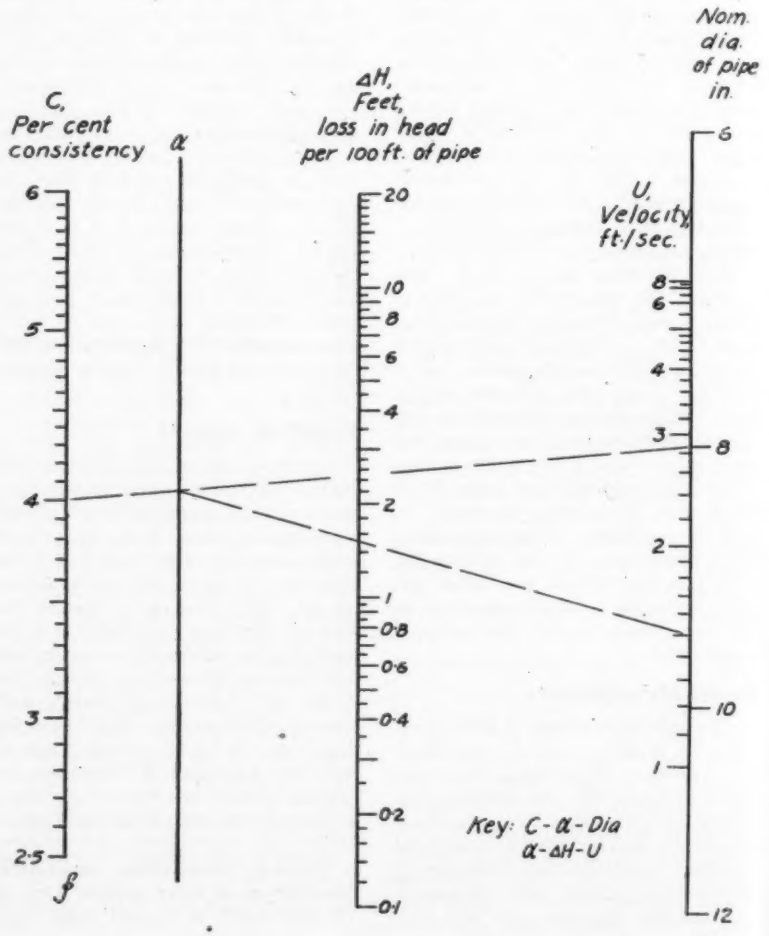
$$\Delta H = \frac{0.151\ U\ C^2}{D\ (10)^{0.05U}}$$

where ΔH = loss in head, feet of suspension, per 100 feet of pipe
U = velocity, feet per second
C = percentage consistency
D = internal diameter of the pipe, feet

Since nomographic solution of this equation is somewhat more convenient than that by slide rule, the accompanying chart, constructed by methods described previously, is offered.

The use of the chart is illustrated as follows: What is the loss in head on pumping a fibrous suspension having a consistency of 4 per cent in an 8-inch standard pipe at a velocity of 1.5 feet per second? Following the key and the index lines, connect 4 on the C-scale with 8 on the scale for nominal pipe diameters and note the intersection with the α-axis. Connect this intersection with 1.5 on the U-scale and read the loss in head at 1.5 feet of suspension per 100 feet of pipe.

The chart can also be used to find the velocity at which a stock of a certain consistency can be pumped in a pipe of given size so that the loss in head will not exceed a specified value. For instance, at what velocity can a 5-per-cent stock be pumped through a 6-inch pipe when a head loss of 5.5 feet of stock is available? Connect 5 on the C-scale with 6 on the nominal pipe diameter scale and mark the intersection with the α-axis. Connect this point with 5.5 on the Δ H scale and read the permissible velocity on the U-scale as 2.3 feet per second. What size pipe is needed so that a 3.6-per-cent stock can be pumped at 3 feet per second without exceeding a head loss of 2 feet of stock per 100 feet of pipe? Connect 3 on the U-scale with 2 on the Δ H-scale and note the intersection with the α-axis. Connect this point with 3.6 on the C-scale and read the pipe diameter as somewhat under 8 inches, showing that an 8-inch pipe, the next largest standard pipe available, would be needed. Index lines for these two illustrations are not shown on the chart.



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Commercial Lignins

ROBERT S. ARIES[1] and ARTHUR POLLAK[2]

This article has been presented in two parts. The first installment appeared in the January issue of this magazine.

▶▶▶ WHILE THE SULPHITE pulp industry is not a direct source of lignins it is an abundant source of a derivative of lignins — the ligninsulphonic acids contained in the sulphite waste liquor. These sulphonic acids have long had a number of uses. Ligninsulphonic acids can be more or less completely desulphonated to yield lignins and some lignins are being made in this way in connection with the manufacture of vanillin from sulphite waste liquor.

Lignins from Sulphite Waste Liquor

The most obvious difference between lignins and ligninsulphonic acids is that the latter are extremely water soluble while lignins are insoluble in water.

The sulphite pulping process, as commonly practiced, utilizes only about 50 per cent of the wood raw material. The non-fibrous wood components solubilized in the cooking process, including the lignins, are allowed to run to waste in most mills.

This waste in the U.S.A. alone totals about 2,500,000 tons of solids annually. Of this about 60 per cent, 1,500,000 tons, are ligninsulphonic acids; sugars amount to another 400,000 tons. The rest is accounted for by about 150,000 tons of sulphonated sugars, 100,000 tons of aliphatic acids, mainly formic and acetic. The balance, 350,000 tons, is largely calcium and sulphur compounds.

It is becoming imperative for acid sulphite mills to find outlets for their lignins which will not be so burdensome as to force them out of business. The practice in the past was largely to dump the lignin-containing material into adjacent streams and rivers. This was found to be a nuisance as it killed or harmed wild life in and about the waterways. Recent federal legislation on the subject is increasingly strict. Many state legislatures have passed, or are considering the passage of, laws forbidding or restricting such dumping.

The calcium lignosulphonates in sulphite waste liquor are believed to be polymers in which the molecules of calcium lignosulphonate vary in size as is evidenced by diffusion, salting out and viscosity studies. It has thus been estimated that molecular weights of calcium lignosulphonates in sulphite waste liquor vary from 2,000 to 15,000. The sulphonic sulphur content of calcium lignosulphonates vary from one sulphur per two building units to one sulphur per four monomer units.

Calcium lignosulphonates undergo many characteristic reactions. Thus they may be alkylated, halogenated, nitrated, hydrogenated, oxidized and hydrolyzed in either acid or alkaline mediums. These reactions are of commercial importance, as in the alkaline hydrolysis of calcium lignosulphonates for the production of vanillin, acetovanillone, catechol, guaiacol and other phenols.

Sulphite waste liquor has long found a number of limited uses based on its physical and chemical properties. In most cases these valued properties cannot be attributed specifically to the lignins or ligninsulphonic acids present. Thus, the liquor concentrated by evaporation is used as an adhesive ingredient of linoleum cements and as a binder as in making some types of cores and molds for casting metals. It is unlikely that the ligninsulphonic acids are any more valuable than the sulphonated sugars for these purposes.

The lignosulphonates are known to be surface active and sulphite waste liquor has found a considerable number of applications as a dispersing, wetting or emulsifying agent.

The search for large scale uses for sulphite waste liquor continues. Only a small portion of the available supply is being utilized. Sulphite waste liquor is offered in the form of a dry powder, as "lignin pitch," and in syrup form containing about 50 per cent solids, as "lignin liquor," by a number of manufacturers. In addition to calcium base sulphite waste liquor, the sodium and magnesium base liquors, as well as liquors comparatively free of bases are available. Liquors of reduced fermentable sugar contents are also being sold. Until an economical process for recovering lignins from sulphite waste liquor is developed, the people requiring large tonnages of lignin itself can consider sulphite waste liquor only as a potential source of supply.

Lignins and Vanillin

The ligninsulphonic acids in sulphite waste liquor can be converted to vanillin and if more uses could be developed for vanillin and its related compounds this means of utilizing sulphite waste liquor could come into general use.

The Marathon-Howard process, operated commercially since 1937, reduced to practical use some of the many researches relating to lignin and vanillin. It also made practical the separation of lignin sulphonates from the other ingredients of sulphite waste liquor. Only one vanillin plant is operating in this country and the sulphite waste liquor from the Marathon Corp. at Rothschild, Wis., could supply the world's current needs for vanillin.

Vanillin can also be made from other lignins or lignin containing materials. Only the lack of large scale uses retards such developments.

The Marathon-Howard Process

This process is of interest not only for the manufacture of vanillin but also for the ligninsulphonates that it makes available. The Marathon-Howard process is a fractional precipitation procedure whereby the sulphite waste liquor is drained off from the cellulose fibers in the blowpit and processed by the controlled addition of lime. The first fraction, obtained by adding lime to the raw sulphite waste liquor in amounts to give a *p*H of 10.5 is separated as a sludge in a settling tank. This sludge, consisting of calcium sulphite and lignin fraction, is returned to the sulphite mill as part of the make-up system for producing calcium bisulphite cooking acid. The overflow from the settling step is treated with additional amounts of lime re-agent to produce a flocculated yellow precipi-

(1) Professor of chemical engineering, Polytechnic Institute of Brooklyn 2, N.Y., and technical director, Northeastern Wood Utilization Council.

(2) Consulting chemical engineer, New York. Formerly director of the development department, West Virginia Pulp and Paper Co.

tate of basic calcium lignosulphonate which is continuously separated on a rotary vacuum filter as a filter cake of 30 to 35 per cent solids. The filtrate from this operation is given a stripping treatment with lime, producing a sludge which is returned to the first stage in the process and a clear effluent which is passed into the river. This effluent has a B.O.D. value of only a third of that of the untreated sulphite waste liquor. The basic calcium lignosulphonate filter cake comprises from 60 to 80 per cent of the lignin present in the waste liquor, and is the starting material for numerous lignin products and derivatives produced in commercial quantities at the Marathon Corp. plant in Rothschild, Wis. The use of such lignin starting material has the following important advantages:

(1) The product gives completely water-soluble lignosulphonates when either neutralized, acidified, or treated with alkali, and such solution has a concentration of 27 to 30 per cent solids.

(2) The basic calcium lignosulphonate filter cake is essentially free from carbohydrates and other nonligneous organic matter and the solubilized products from it may be conveniently dried to nonhygroscopic, free-flowing powders.

(3) The basic calcium lignosulphonate obtained from the described lime precipitation process is a fairly well defined fraction of lignosulphonates from which the low as well as the high molecular weight lignosulphonates are absent. This is of value for various industrial applications.

Through processing of the basic calcium lignosulphonate, a number of water soluble lignosulphonates have been produced and are available commercially in carload quantities. Thus the neutral calcium lignosulphonate is used as a dispersant under the trade name "Marasperse C." Various grades of sodium lignosulphonates are used as a dispersant and boiler water treating agent. A magnesium lignosulphonate blended with specific vegetable tans is marketed as a tanning agent. The basic calcium lignosulphonate is also in part passed through a press which reduces its moisture content to around 50 to 55 per cent, and thence through a tube dryer to produce a black, granular product sold as Maratex, and used as a grinding aid and binder.

Part of the basic calcium lignosulphonate is also the starting material for production of vanillin. In this process the filter cake is mixed with caustic soda, which solubilizes it, and the resulting solution is subjected to a pressure cook with simultaneous introduction of air to produce a controlled oxidation. The cooked liquor is subjected to a liquid extraction with butanol. The vanillin which enters into the butanol phase is recovered from the solvent and purified to give a U.S.P. grade vanillin. The extracted cooked liquor contains partially desulphonated lignosulphonate from which a purified fraction is isolated and marketed under the trade name "Marasperse CB" as a dispersing agent, particularly effective for aqueous carbon black dispersions. Efficient boiler water treating agents are also produced by processing the extracted vanillin liquor.

Alkali Lignins

This term has been a general designation for the lignins available from the soda and sulphate pulp processes.

The sulphate pulp industry alone burns up about two million tons of lignin every year. This amount is potentially available in the United States from the waste black liquor of that industry. This is about ten times as much lignin as is potentially available from soda pulp mills.

Lignin is more readily available from soda and sulphate pulp mills than from sulphite pulp mills. It is easier to separate from its other constituents. In sulphite waste liquor, lignin occurs as a stable sulphonate from which it is hard to split off. There are, of course, many uses for lignin sulphonates, but where lignin itself is desired the black liquor from soda or sulphate pulp is a more ready source.

Lignin is reclaimed from sulphate pulp in much the same way as has been utilized in the mills making soda pulp. The art is old. Just as with soda black liquor, an acid substance is added. Lignin or sodium lignate precipitates and the precipitate is separated or filtered by any means ingenuity might suggest. This precipitate is refined just about as is done with soda lignin.

There are some differences between the lignins from the soda and the sulphate processes. One arises more from the kinds of woods used rather than for any processing difference. The lignin of hardwoods has more methoxyl groups in its molecule than that of softwoods. Soda mills cook mostly hardwoods, and contrarily, sulphate mills cook softwoods, mainly pine. On the other hand, softwood lignin has more hydroxyl groups per molecule. The exact amounts found depends on the kinds of wood used.

Another variation between the lignins of soda and sulphate mills is that where sodium sulphide is used in the cooking liquor, some of the lignin forms a near relative in properties, known as thiolignin. Thiolignin has one atom of sulphur per monomer. The lignin from sulphate pulp mills is about half thiolignin. Since some so-called soda mills often actually use some sodium sulphide in their cooks, lignin from soda mills often contans some thiolignin also.

With 800 pounds of lignin available for every ton of sulphate pulp made, the potentialities are enormous — at least production-wise.

So far the properties of alikali lignins have been so little studied that no commercially significant differences between soda hardwood and sulphate pine lignins have been reported.

The current utilization of these lignins is negligible compared to the prodigious tonnage available. The consumption in the United States was probably about 1,000 tons in 1948.

A number of potentially large-scale uses for alkali lignins are being tried out. Some of these such as the ones studied for private companies at the Polytechnic Institute of Brooklyn, cannot yet be disclosed but others have already been noted. Because of the large size of the rubber industry, the writers and others have done a good deal of work studying the utilization of lignins in rubber as reinforcing agents to complement the benefits of carbon black, calcium silicate and other fillers, especially when masterbatched with synthetic rubber latex. This is a promising development already commercialized in North America, which should offer special advantages to countries which import carbon black and other rubber chemicals. Reinforcing lignins should be a profitable investment for private capital abroad, and should aid many national economies of the countries concerned.

Extensive work has been done with some of the derivatives of lignin. Sodium lignates are good dispersing agents. Various metallic salts of lignins have interesting properties. The aliphatic esters and aromatic ethers of lignins appear useful for protective coatings, being film forming, and also for plastics.

Lignins also promise to become useful as a base exchange material. The adhesives industry should find lignins useful. The tanning industry may find it effective in the form of suitable derivatives. Ore flotation uses them in substantial quantities.

Lignins From Black Liquor

The processes used for recovering lignins from soda and sulphate black liquor vary only in details and such processes date back into the last century.

The black liquor of the soda or sulphate process is analogous to the sulphite waste liquor of the acid sulphite process. In both cases they contain in addition to lignin, many other organic materials.

Where in the acid sulphite process the lignins are solubilized by converting lignins into sulphonates, in the alkaline process the lignins are solubilized by forming the sodium salt or phenolate of lignins, that is caustic soda reacts with the phenolicehydroxyl group in lignins. The resulting sodium lignates are water soluble.

Sodium lignates are very soluble in the highly alkaline black liquor and can be precipitated by reducing its alkalinity. This is the basis of all processes for the recovery of lignins from black liquors. The carbon dioxide of flue gas suffices for this or stronger acids can be used.

Unlike sulphite waste liquor, black liquor is valued for its soda content and the efficient recovery of soda is essential to the pulp process. Further, the recovery process equipment is expensive. In consequence a lignin recovery process must not seriously impair the efficiency of soda recovery nor should it render the expensive recovery units obsolete, unless the lignins made could bear the burden of the increased costs that might result.

These conditions have led to the processes whereby sodium lignates are precipitated in about 50 per cent yield by a mild decrease in the alkalinity of the black liquor. The sodium lignates are separated and the treated black liquor is returned to the pulp mill recovery cycle. The sodium lignates so made are then acidulated with stronger acids to liberate the lignin. The lignin is then usually dried for sale.

The sodium lignates as precipitated containing more or less of occluded black liquor, find a number of uses. They are sold after drying by both the Mead Corporation and the West Virginia Pulp and Paper Company. The former offers such a soda hardwood lignate under the trade name *Meadol MWS*, the latter as *Indulin C*.

The corresponding free lignins, dry, are sold as *Indulin A* by the West Virginia Pulp and Paper Company and as *Meadol MRM* by the Mead Corporation. The Howard Smith Paper Mills of Canada offers a similar soda hardwood lignin under the name of *Tomlinite*.

Scholler Process Lignin

When wood is hydrolyzed with acid, two fractions result. The water soluble fraction contains sugars which are fermentable to ethyl alcohol, butyl alcohol, and acetone, 5,37-butylene glycol, yeast, and also other chemicals under the proper conditions. The water insoluble residue is ligneous in nature.

The shortage of alcohol during the recent war caused renewed interest in the process which had been used to some extent at earlier dates, and then was abandoned. The variations in processing were reviewed and the modified Scholler process was selected for development in this country. Most of the development was carried on by the United States Forest Products Laboratory, aided in the practical phases by the Vulcan Copper & Supply Company. Since the hydrolysis has been described in good detail in recent articles it will not be considered further here.

Of great importance to the economical operation of the wood saccharification process in the U.S.A. is the profitable recovery and subsequent disposal of by-products. For each gallon of alcohol, 13 pounds of ligneous residue are produced. Thus, if this product could be sold with a margin of one cent per pound over operating costs of drying or other required treatment, it could reduce the charges made against the alcohol by 13 cents. Higher margins would permit further credits to the alcohol. Other by-products such as furfural, acetic acid, and tannins are also suggested; but details of securing these by-products have not yet been successfully worked out.

There are many suggested uses for the lignin residue. These suggestions are made based on uses developed largely for the more purified lignins which are available from one of the pulping processes. The residue from the saccharification process is so impure that no uses except fuel have actually developed for it. The fuel value of the residue is about 10,000 Btu per lb. Thus it is not even worth as much as bituminous coal.

The properties of the residue which must be improved to make utilization reasonable include purification. The residue may contain as much as 20 per cent cellulose. The true lignin content may be as low as 50-60 per cent. The maximum weight of lignin of a quality equivalent to that of the pulp process lignins is only about 7 pounds per gallon of alcohol.

Furfural Process Lignin

According to the information available, oat hulls, rice hulls, corn cobs, and possibly other agricultural wastes are used. These materials are hydrolyzed with sulphuric acid. The solid residue resulting is separated from the furfural containing liquors as a mash containing 40 per cent water. It is strongly acidic and the next step is neutralization. It is then dried and ground. The product has a lignin content of about 32 per cent.

This product, known as Isofil#3, is said to be useful in plastics as a filler. Because of its low lignin content, not much higher than wood, perhaps it should not even be considered a lignin product. It is even possible that the furfural present, as such or even combined with the lignin, contributes more to the reported usefulness of this material than the lignin. Furfural processes in use abroad utilize hardwoods or straw and give rise to interesting possibilities, which are being actively studied by the authors.

Steam Hydrolysis Lignin

The process of hydrolyzing wood with high pressure steam is a modification of the general scheme of acid hydrolysis. It is distinctive enough, however, to deserve separate description.

As in other wood decomposition processes, the raw material is first chipped and screened. The chipped wood is then introduced into vessels which are called "guns." Steam at pressures of 250 to 1000 pounds psi is then admitted. After a short cooking period, the pressure is suddenly released. The rapid expansion of the steam causes a defibration of the wood chips. The resulting fibrous material is used on standard and modified type paper machines for making pressed boards, insulating bats, and other similar structural items.

The action taking place during the cooking is not too well understood. A likely explanation is that the hemicelluloses and possibly some of the cellulose are decomposed. Formic and acetic acids are also formed, and these may aid hydrolysis. In any case, the lignin content of the fibrous material is about 35 per cent compared with the 25 per cent initially in the wood.

The material separated in this process and offered as lignin contains only slightly more lignin than the fibrous material. It is understood to be the insoluble fines which pass through the screens used in making the boards. It sells in the same price range as wood flour, and is said to be useful mainly as a filler in plastics.

As far as is known, the Masonite Corporation is the only company operating such a process in this country, although a number of companies operate abroad. The Masonite trade name Benaloid is used for the lignin-containing product. The explosion process is covered in detail by patents.

While not pertinent to the subject of lignin, it is of interest to note that the Masonite Corporation is making an attempt to market another portion of the wood—the hemicellulose. This is prepared as both a concentrated extract and as a dry material. It is offered under the trade name Benalex.

Lignin From Bark

While not lignins in a very pure form, there is a group of commercial

(Turn to page 1323)

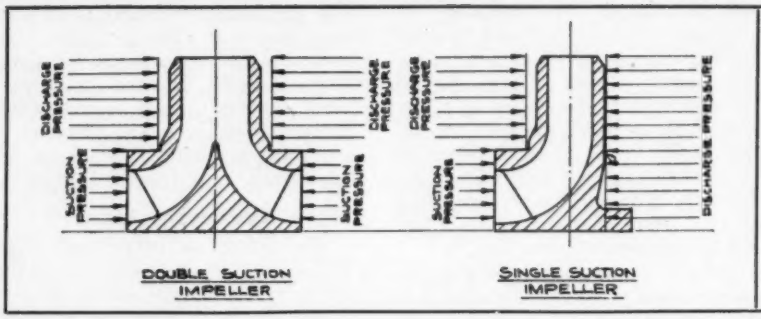


Fig. 1—Comparison of double-suction and single-suction impellers with reference to origin of axial thrust.

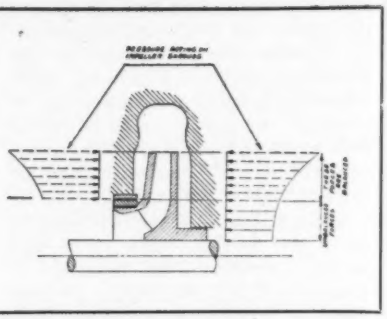


Fig. 2—Actual pressure distribution on front and back shrouds of single-suction impeller with shaft passing through impeller eye

Centrifugal Pump Design

Part 5 in a series outlining the important detail of centrifugal pump design, construction, and operation. This article deals with axial thrust problems in both single-stage and multistage pumps, and describes hydraulic balancing devices.

IGOR J. KARASSIK and ROY CARTER
Application Engineers
Worthington Pump & Machinery Corporation

▶▶▶ AXIAL HYDRAULIC thrust is the summation of unbalanced forces on an impeller acting in the axial direction. Inasmuch as reliable thrust bearings of relatively large thrust capacity are now available, axial thrust in single-stage pumps is no longer a matter of great concern except for certain high pressure applications and in large pumping units.

Single-stage Pumps

An ordinary single-suction radial-flow impeller, with the shaft passing through the impeller eye, is subject to an axial thrust because it exposes more back wall surface to the discharge pressure than the opposed front wall, a portion of the front wall being exposed to the suction pressure. If it were assumed that the pressure in the discharge chamber is uniform over the entire area of the impeller, the axial force acting towards the suction of the impeller would be equivalent to the product of the net pressure generated by the impeller and of the unbalanced annular area. In contrast, a double-suction impeller is theoretically in axial balance, as illustrated by Figure 1.

This axial balance of double suction impellers is based on the assumption that the liquid enters the impeller in equal volume from both sides. As the impeller inlet openings are also supposed to be equal, the pressure on one side of the impeller is equal and opposite to that on the other side. Practically, a double-suction impeller may still develop an unbalanced axial thrust for a variety of reasons. The liquid whirling around the outside surface of the impeller shroud does not necessarily have the same characteristics of flow on both sides, especially if the impellers are not centrally located with respect to the casing, thus setting up pressure differences between the two sides. In the event the suction passages do not afford an absolutely symmetrical flow to the two sides of the impeller, there is the possibility that these two sides will perform unequal work, such a condition affecting both the efficiency of the pump and the theoretical balance of the axial hydraulic thrust. The same inequality may be imposed by conditions external to the pump itself, such as the location of an elbow too close to the suction nozzle. Finally, there may be an unequal amount of leakage taking place past the two wearing rings. All of these factors may unite to create a definite axial unbalance which must still be compensated, and therefore all centrifugal pumps, even when built with double-suction impellers, are provided with thrust bearings.

Actually, the pressure acting on the two walls of a single-suction impeller is not uniform over the entire area exposed to the discharge pressure. This lack of uniformity is derived from the fact that the liquid trapped between the impeller shrouds and the casing walls is in rotation and the pressure acting at the periphery of the impeller is appreciably higher than the pressure at the impeller hub. While there is no particular interest in the derivation of the theoretical calculations necessary to determine this pressure variation, a qualitative presentation of this variation is illustrated on Figure 2. Therefore, the axial thrust acting towards the suction of the impeller is somewhat less than the net pressure times the unbalanced area. As an approximation, it can be said that this thrust may range from 70 to 80 per cent of the value which would be based on the assumption of a uniform pressure distribution.

Eliminating Axial Thrust

In order to eliminate the axial thrust of a single suction impeller, it is possible to provide it with wearing rings both in front and in back, the inner diameter of both rings being made the same so as to equalize the thrust areas, as shown in Figure 3. The pressure in the chamber located inwardly of the back wearing ring is maintained substantially equal to the suction pressure by drilling so-called balancing holes through the impeller. The leakage past the back wearing ring is returned into the suction area through these balancing holes. In certain cases—especially when large single-stage, single-suction pumps are involved—the use of balancing holes is considered disadvantageous because the leakage through these holes issues into the impeller suction in a direction opposite to the main flow, creating undesirable

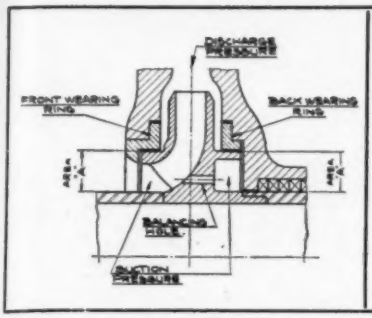


Fig. 3—Balancing axial thrust of single-suction impeller by means of wearing ring at the back and balancing holes

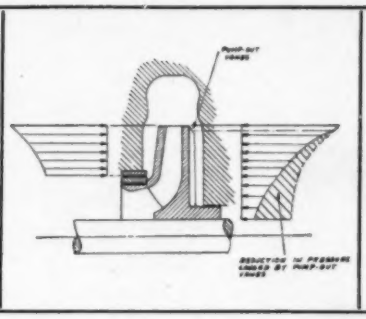


Fig. 4—Balancing axial thrust of single-suction impeller by means of pump-out vanes on the back shroud

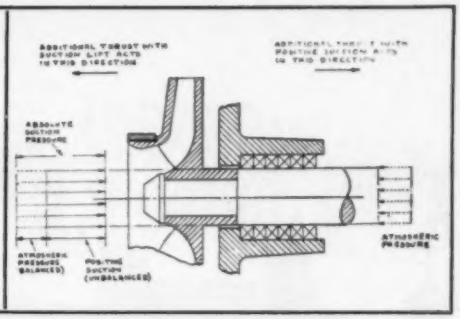


Fig. 5—Single-suction overhung impeller type pump with single-stuffing box

disturbances. The balancing holes are then replaced with a piped connection to the pump suction.

Another method used to eliminate or reduce the axial thrust of single-suction impellers is the provision of pumpout vanes on the back shroud of the impeller. The effect of these vanes is to reduce the pressure acting on the back shroud of the impeller (Figure 4). Such a construction, however, is mostly limited to pumps handling gritty liquids, where it serves the primary purpose of keeping the clearance between the impeller back shroud and the casing free of foreign matter.

So far, the discussion of the axial thrust has considered single-suction impellers where the shaft passes through the impeller eye and where the pump is provided with two stuffing boxes, located on both sides of the impeller. In such a case, the magnitude of the suction pressure does not affect the resulting axial thrust. On the other hand, the axial forces acting on an overhung type impeller with a single stuffing box (as in Figure 5) are definitely affected by the suction pressure. This is due to the fact that, in addition to the unbalanced force illustrated in Figure 2, there is an axial force equivalent to the product of the cross-sectional area of the shaft through the stuffing box and of the difference between the suction pressure and the atmospheric pressure. This force, therefore, may act either towards the impeller suction, when the suction pressure is less than atmospheric or in the opposite direction when it is higher than atmospheric.

The magnitude of this force when the pump handles a suction lift is very low. For instance, if the shaft diameter through the stuffing box is 2 inches (area — 3.14 sq. in.) and if the suction lift is equivalent to 20 feet of water (absolute pressure = 6.06 psi), the axial force due to the use of the overhung impeller and acting towards the suction will be only 27 lb., very little indeed. If the suction pressure is 100 psi gauge, the force will act in the opposite direction and will be 314 lb. It is obvious, therefore, that since the same pump may be applied to a variety of conditions of service over a wide range of suction pressures, the thrust bearing of single-suction overhung impellers must be generally arranged to take thrust in either direction and must be selected with a thrust capacity sufficient to counteract forces set up under the maximum suction conditions which have been established as the maximum limit for the particular pump in question.

In addition to radial flow impellers, mixed flow and axial flow impellers are commonly used. Except for very large sizes and certain special applications, the maximum thrust which may be developed by such impellers is not of great importance since the operating heads are relatively low.

In the case of axial flow impellers, there is an axial thrust caused by the pressure imposed on the vanes as they act on the water. In addition, there is a difference in pressure acting on the two ends of the shaft hub, one end being subject to discharge pressure and the other to suction pressure. Occasionally, provision is made in an axial flow pump for a leakage joint at or near the periphery of the discharge hub, with balancing holes through the hub. This construction is used mainly in vertical wet pit pumps with covered shaft designs, in order that the seal at the lower end of the cover pipe be subjected to suction pressure rather than to discharge pressure.

In the cast of mixed flow impellers, the axial thrust is a combination of the forces caused by action of the vanes on the water and of the forces arising from the difference in the pressures acting on the various surfaces. It is very common practice to provide wearing rings on the back side of mixed flow impellers and either balancing holes through the impeller hub or an external balancing pipe leading back to the suction.

In some designs of large mixed flow impellers as well as some high head vertical pumps with single suction radial type impellers, the leakage joint on the back side of the impeller used to be made larger in diameter than the leakage joint on the suction side. Such a construction causes the axial thrust to act upwards balancing the dead weight of the rotor and tending to lift it upwards. This practice has fallen into disuse since more reliable thrust bearings have been made available.

The use of wearing rings on the back side of large capacity sewage pumps with mixed flow impellers does not meet with general approval and is, therefore, seldom encountered, even though their absence leads to the necessity of larger capacity thrust bearings.

Multistage Pumps

The virtual absence of unbalanced axial thrust and the greater suction areas available in a double suction impeller would appear to be of sufficient advantage to apply such impellers to multistage pumps as well. This design, however, when applied to multistage units, carries with itself certain definite shortcomings. The average multistage pump is of relatively low capacity when compared to the entire range covered by modern centrifugal pumps. As a result, it is seldom necessary to use double-suction impellers for the sole purpose of reducing the net positive suction head required for a given capacity. Even if a double-suction impeller becomes desirable for the first stage of a large capacity multistage pump, it is hardly necessary to use such impellers for the remaining stages. As to the advantages to be derived from the axial balance of a double-suction impeller, it must be considered that a certain amount of axial thrust is present in all centrifugal pumps and, therefore, the necessity of a thrust bearing is not eliminated.

The shortcomings of the use of double-suction impellers in a multi-

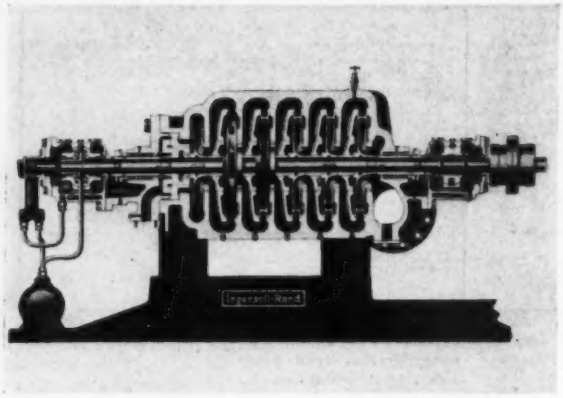


Fig. 6—Multistage pump with single-suction impellers all facing in one direction and with a hydraulic balancing device. (Courtesy Ingersoll-Rand)

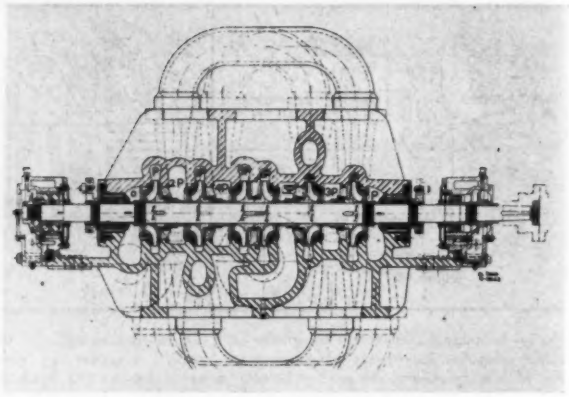


Fig. 7—Six-stage, "opposed impellers" pump

stage pump lie mainly in the fact that this construction adds needless length to the pump shaft span. Additional space is required for the extra passage leading to the second inlet of each successive stage and, in the case of a pump with four or more stages, this increase in shaft span becomes quite appreciable, to say nothing of the added casting difficulties. In the event the shaft diameter is increased to compensate for the longer shaft span so as to maintain a reasonable shaft deflection, the areas of the impeller inlets are correspondingly reduced, with the result that the margin of advantage of the double suction impeller design from the point of view of suction conditions becomes even less appreciable. Finally, since it appears impractical to arrange the various impellers within a double-suction multistage pump in any order other than the ascending order of the stages, it follows that the impeller at one end of the casing is the last stage impeller and that the pressure acting on the adjacent stuffing box will be the discharge pressure of the next to last stage. To reduce this pressure, it becomes necessary to interpose between the last stage impeller and the stuffing box some form of a pressure reducing bushing which further increases the over-all length. As a result of these considerations, the majority of multistage centrifugal pumps are built with single-suction impellers.

There are two obvious arrangements of single-suction impellers for a multistage pump:

1) Several single-suction impellers may be mounted on one shaft, each of these impellers having its suction inlet facing in the same direction, the stages following each other in the ascending order of pressure (Figure 6). The axial thrust is then balanced by a hydraulic balancing device, as will be described later.

2) An even number of single-suction impellers can be mounted on one shaft, half of the impellers facing in a direction opposite to the second half, so that the axial thrust in one direction on half of the impellers is compensated by the thrust in the opposite direction acting on the second half, (Figure 7). This mounting of single-suction impellers back to back is frequently referred to as "opposed impellers."

This last arrangement can be changed to use an uneven number of single-suction impellers, provided the resulting axial unbalance is taken care of by the proper choice of shaft and interstage bushing diameters, so as to give the effect of a hydraulic balancing device to compensate the hydraulic thrust of one of the stages.

Arrangement of Stages

Once a multistage pump is balanced through the use of opposed impellers, it remains to determine the most satisfactory sequence in which the individual stages are to be arranged within the pump casing. There are three separate factors which enter into the analysis of a satisfactory stage arrangement and the final solution must, perforce, become a compromise between the individual "best" solutions, each of which satisfies these three factors:

1) The pressure difference between any two adjoining stage chambers should be kept to the minimum possible and several low pressure running joints are to be preferred to a fewer number of joints subject to a relatively high pressure.

2) The various stage impellers should be so arranged that the stuffing boxes will be subjected to the lowest pressure within the pump.

3) The sequence of the stages should be such as to avoid excessive complications in the forming of the interstage passages.

Hydraulic Balancing Devices

A hydraulic balancing device may take the form of a balancing drum, a balancing disk or of a combination of these two.

The operation of the balancing drum is illustrated schematically in Figure 8. The balancing chamber at the back of the last stage impeller is separated from the pump interior by a drum, keyed or screwed to the shaft. The drum thus rotates with the shaft and is separated by a small radial clearance from the stationary portion of the balancing device (called the balancing drum head)

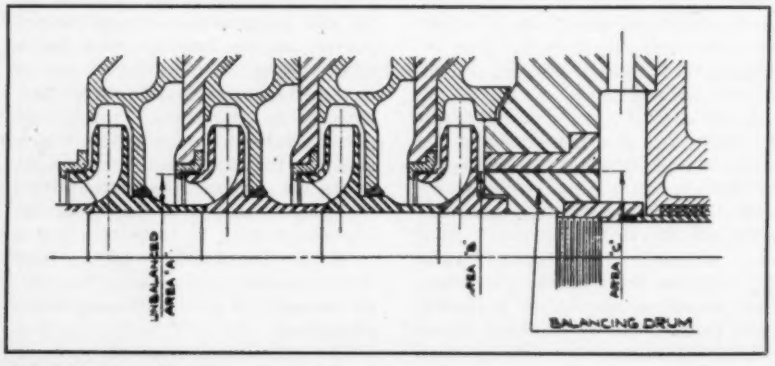


Fig. 8—Balancing drum

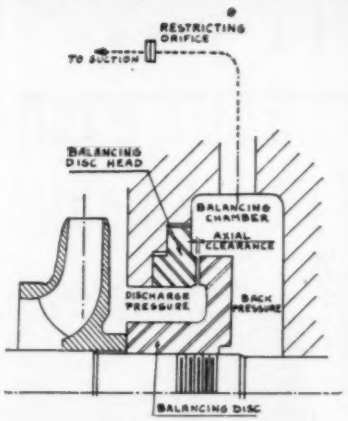


Fig. 9—Simple balancing disk

which is fixed to the pump casing. The balancing chamber is connected to the pump suction. By reason of this arrangement, the back pressure in the balancing chamber is but slightly higher than the suction pressure, the difference between the two being equal to the friction losses between this chamber and the point of return. The leakage which takes place between the drum and the stationary portion of the balancing device is of course a function of the differential pressure existing across the drum and of the clearance area available for the flow to take place.

Referring to the diagram, it will be seen that the forces acting on the balancing drum are as follows:

a) Toward the discharge end: Discharge pressure times area B

b) Towards the suction end: Back pressure times area C (where area B equals area C).

It is obvious that force (a) is greater than force (b) and will act to counter balance the axial thrust exerted upon the single suction impellers. Actually, the drum diameter can be so selected as to result in balancing this axial thrust either completely or within 90 to 95 per cent, depending on whether or not it is desired to carry any portion of the axial thrust on the thrust bearing itself.

Balancing Disk

The operation of a simple balancing disk is illustrated in Figure 9. The disk is fixed to and rotates with the shaft, being separated from the balancing disk head by a small axial clearance. The leakage through this clearance flows into the balancing chamber and thence to the pump suction just as in the case of the balancing drum. The back of the balancing disk is subject to the back pressure in the balancing chamber, while the face of the disk is acted upon by an intermediate pressure which is equal to the discharge pressure at the smallest diameter of the disk and to the back pressure at its periphery. The inner and outer diameters of the disk are so chosen that the difference between the total force acting on the disk face and that acting on its back balance the axial thrust exerted upon the impellers.

If at any time in operation the axial thrust of the impellers exceeds the force acting on the disk in the opposite direction, the latter is moved towards the disk head, reducing the axial clearance between the disk and the disk head. The amount of leakage through the clearance is reduced with the result that the friction losses in the return line are also reduced, lowering the back pressure in the balancing chamber. This automatically increases the pressure difference acting on the disk and moves it away from the disk head, increasing the clearance. Now, the pressure builds up in the balancing chamber and the disk is again moved towards the disk head until an equilibrium is reached when the thrust forces balance in both directions.

The operation of the combination balancing disk and drum is illustrated in Figure 10. The rotating portion of the balancing device consists of a long cylindrical body which rotates within the drum portion of the disk head, followed by a disk similar to the one previously described. The radial clearance is, of course, constant regardless of the position of the disk while the axial clearance varies with the axial position of the pump rotor. It will be seen that the forces acting towards the discharge end are made up of the sum of the discharge pressure times area A plus the average intermediate pressure times area B, while the force acting towards the suction end is the back pressure times area C.

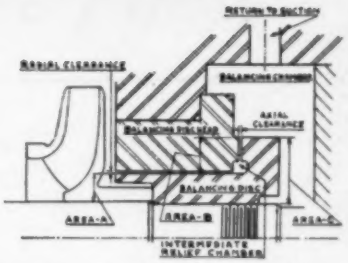


Fig. 10—Combination balancing disk and drum

While the "position-restoring" feature of the simple balancing disk was based on the wide variation of the back pressure which should preferably be kept to as nearly a constant value as possible, it now becomes possible to depend upon a variation in the intermediate pressure to achieve the same effect. This is accomplished in the following manner: when the pump rotor moves towards the suction end (to the left on Figure 10) because of an increased axial thrust, the axial clearance is reduced and pressure builds up in the intermediate relief chamber, increasing the average value of the intermediate pressure acting on area B. In other words, with a reduced leakage, the pressure drop through the constant radial clearance decreases, increasing the pressure drop across the axial clearance. The increase in the intermediate pressure forces the balancing disk towards the discharge end (to the right on Figure 10) until an equilibrium is reached. Movement of the pump rotor towards the discharge end, on the other hand, would have the effect of increasing the axial clearance, increasing the leakage and decreasing the intermediate pressure acting on area B.

Commercial Lignins

(Continued from page 1319)

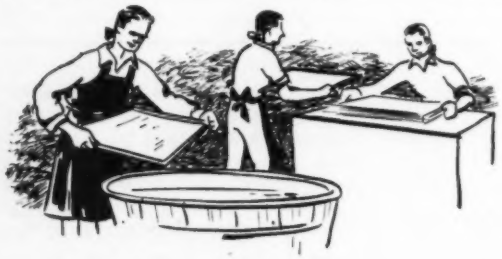
products, which, because of their high lignin content and lignin-like characteristics should be considered here. These are the Silvacon products manufactured by the Weyerhaeuser Timber Co. from Douglas fir bark. The lignin content of certain of these materials is as high as 75 per cent.

Since they are manufactured by mechanical, rather than chemical processes, an admirable quality of the Silvacons is that they represent lignin in its natural form, unaltered by chemical treatment as happens in the usual reactivity of the lignin manufacture. For certain uses, the natural reactivity of the lignin is available for reaction with other chemicals instead of being spent in the process of isolation.

In the process of Silvacon manufacture, Douglas fir bark, free of wood, is first ground to a size suitable for ease of handling, then it is dried and further processed for separation into its three basic components, fiber, cork and powder. The latter two are particularly rich in lignin. Separation into these three basic constituents and mixtures thereof is accomplished by a series of screening, ball milling air fractionation steps.

The important feature of Silvacon from the lignin point of view is that it is a form of lignin in its mechanically manufactured condition. Furthermore, by chemical treatment as with the common alkalies, a chemical lignin is produced "on the job," providing a more economical lignin for some purposes than can be produced when it is necessary to go through the steps of a chemical lignin manufacturing process.

BEFORE 1800, A "DAY'S WORK" FOR A CREW OF THREE HAND PAPERMAKERS IN THE UNITED STATES WAS FOUR AND ONE-HALF REAMS (2160 SHEETS) OF 20 INCH BY 30 INCH NEWSPAPER.



SO SCARCE WAS PAPER IN THE SOUTHERN STATES DURING THE CIVIL WAR, PEOPLE USED THE REVERSE SIDES OF LABELS FOR WRITING LETTERS.

WOMEN MADE AND SOLD MOST OF THE COLORED PAPER USED AS FLYLEAVES IN EARLY EUROPEAN BOOKS.

CHIP BOARD AND CORRUGATED CARTONS FOR TOOLS, METAL PARTS, AND APPLIANCES, ARE BEING RUST-PROOFED BY A NEW PROCESS WHICH IMPREGNATES THE PACKAGE MATERIAL WITH A NON-RUST VAPOR WRAP CHEMICAL.

What's YOUR problem?

R. L. Jenkins, lubricating specialist at Standard Oil's South Bend office solved this customer's problem because he was thoroughly familiar with job requirements and the application of his Stanorust line.

● There is a corps of such lubricating specialists throughout the Midwest, trained and experienced to help plant operators solve similar problems. Experience enables these men to find quickly the cause of lubricating troubles. Knowledge of petroleum products enables them to prescribe the lubricant needed. There is one of these lubricating specialists at the Standard Oil Company (Indiana) office near you. He is there to serve you. A call or a card will put him at your service.

Investigate the cost-saving possibilities of these lubricants.

STANOIL INDUSTRIAL OILS—for cleaner hydraulic systems, gear cases, compressors, and circulating systems.

CALUMET VISCOUS LUBRICANTS—adhere to open gears and chain drives without throw-off. Easy to apply. No heating.

STANOLITH GREASE—withstands high temperatures and resists washing by water.

THE SHOP FOREMAN of Hart Pressed Steel Corp., Elkhart, Indiana, exposes the clean metal surface beneath a coating of STANORUST 1-XC Rust Preventive by a simple wiping operation. The die shown has been protected against rust under severe outdoor conditions for over a year by STANORUST 1-XC.

How to prevent rust under severe outdoor storage . . .

RAIN, snow, heat, cold—plus coal soot from passing locomotives—could be expected to produce serious rust troubles in outside storage. The elements did, indeed, cause difficulties for the Hart Pressed Steel Corp., Elkhart, Indiana, which owns the truck and trailer dies shown above. Despite coatings of heavy oil, rusting was so severe that cleaning a die required at least three hours.

The problem was laid before a Standard Oil lubrication specialist. He pointed out that, to withstand severe outdoor exposure, a rust preventive with special qualities is needed. At his suggestion, the dies were coated with STANORUST 1-XC, a rust preventive especially developed for severe outdoor service.

Use of a STANORUST Rust Preventive has made savings for this company. Many of the dies have been exposed to the weather for over a year, yet STANORUST has kept them completely protected against rust. A die can now be cleaned and returned to service in a matter of ten minutes, as compared with the three hours previously required.

The new and improved STANORUSTS can mean big savings for you through more economical applications, better rust protection. There's a lubrication specialist near you who can help you get the most economical results. How you can obtain his services is described at left. Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

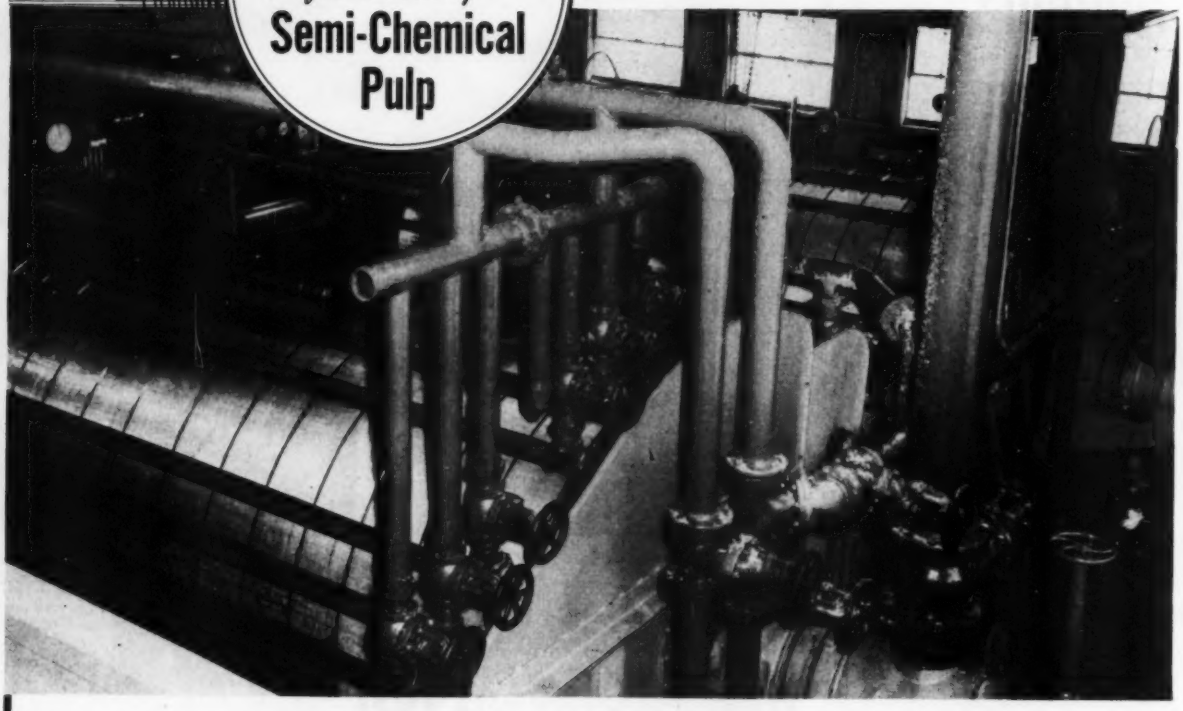
STANORUST
REG. U. S. PAT. OFF.
RUST PREVENTIVES

STANDARD OIL COMPANY (INDIANA)

STANDARD

OLIVER "RINGVALVES"

for washing
Semi-Chemical Pulp



A book could be written about the wide use of the Oliver Ringvalve Filter for washing sulphate and sulphite stock . . . how its unique design and uniform sheet promote high washing efficiency . . . how its flexibility permits wide variations in washing methods.

Here's a "Ringvalve" installation at Sonoco Products Company, Hartsville, S. C. where the filters are operating on semi-chemical pulp and doing a fine job . . . more evidence of the versatility of the Oliver Ringvalve Washer! At present the two filters are operating as a 4-stage, series washing system. Later, when the tonnage is doubled, a third unit will be added and the system changed to 3-stage counter-current washing.

With such a fine record being made by the Oliver Ringvalve Washer in over 30 mills—a record of high washing efficiency, flexibility in operation, sustained overload or surge capacity—can you afford not to investigate fully its merits for your pulp washing requirements?

OLIVER UNITED FILTERS INC.

New York 18, N. Y.
33 West 42nd Street

Chicago 1, Ill.
221 N. LaSalle Street

Western Sales Div:
Oakland 1, Calif.
2900 Glascock Street
San Francisco 11, California

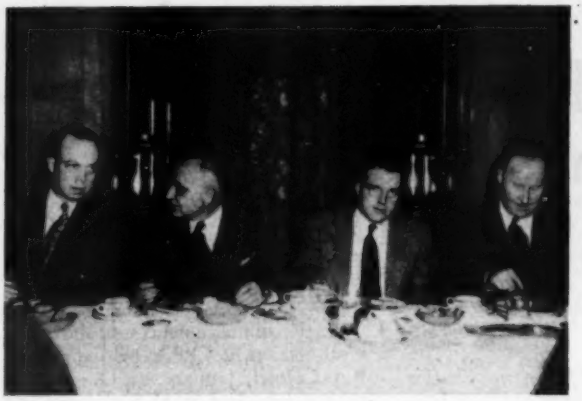
Sales & Manufacturing Representative:
E. Long Limited, Orillia, Ont., Canada

Factories: **Oakland, Calif. • Hazleton, Pa. • Orillia, Ont., Canada Melbourne, Australia**

The Paper Industry Association News

15th Annual Papermakers Get-together

Michigan Superintendents and Kalamazoo TAPPI



THE LARGEST GATHERING in the history of the annual get-together meetings of the Michigan Div. of the Superintendents Association and the Kalamazoo Section of TAPPI was recorded when 400 persons attended the dinner at Hotel Harris in Kalamazoo on January 12.

Atomic architecture was explained by the guest speaker, Jack T. Wilson, physicist, Allis-Chalmers Mfg. Co., Milwaukee (shown at extreme left of illustration at left above). The electron, the positron, the neutron, and the proton were set up as the four fundamental particles of the atom structure.

Seated next Mr. Wilson is R. A. Hayward, president of Kalamazoo Vegetable Parchment Co., who acted as toastmaster. Mr. Hayward reminded those present that these annual affairs had developed from an idea promoted by the late Mike Redmond (Kalamazoo Paper Co.), long active in the affairs of the Superintendents Association and an active participant in the affairs of TAPPI.

Beside Mr. Hayward is W. F. Hathaway, Kalamazoo Vegetable Parchment Co., and chairman of the Michigan Div. of the Superintendents Association.

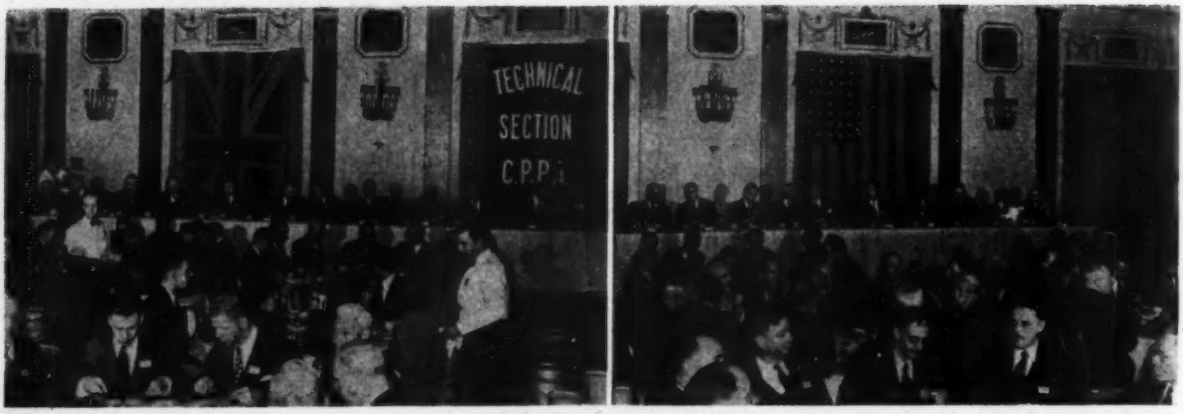
At the extreme right is R. G. Macdonald, national secretary-treasurer of TAPPI.

Moving along the big table in the illustration at right (L to R): Fred C. Goodwill, res. mgr., Bryant Div., St. Regis Paper Co.; Harry E. Weston, associate secretary-treasurer of the national Superintendents Association; Robert B. Wolf (retired, formerly Weyerhaeuser Timber Co.); and Chas. H. Reese, national president of the Superintendents Association.

Another group at the get-together: (L to R, above) O. W. Callighan, second vice chairman, and Richard H. Peeters, secretary-treasurer of Michigan Division of the Superintendents Association; Monsg. John R. Hackett, a guest; and A. L. Sherwood, national committeeman.

First vice chairman, Wm. Shaw, of the Michigan Div. Superintendents Association, is shown (left) in illustration at right. Next is the Rev. Louis Grothers, who gave the invocation; then Glen Sutton, 4th national vice president of the Superintendents Association.

Next are officers of the Kalamazoo Valley Section of TAPPI: Dr. James J. Harrison, vice chairman; Frederick L. Schuker, treasurer; and John R. Dam, secretary.



Technical Section of the CPPA holds annual luncheon in Mount Royal Hotel

CPPA and Technical Section Hold Annual Meetings

▸▸▸ FROM ALL PARTS OF Canada and the United States, about 1500 executives, engineers, chemists, mill superintendents, officials, and others associated with the pulp and paper industry, gathered in Montreal on January 25 for a three-day meeting of the Canadian Pulp and Paper Association and its Technical Section.

H. S. Foley, chairman of executive board, Canadian Pulp and Paper Association

The annual meeting of Association Councillors was held on January 27. Harold S. Foley, chairman of the Association's executive board, and president of Powell River Co., Vancouver, B.C., presided. All officers of the Association were re-elected. The slate which stands is:

Chairman of Executive Board—H. S. Foley, president Powell River Co., Ltd., Vancouver, B.C.

Vice Chairman—L. J. Belnap, chairman, Consolidated Paper Corp., Montreal

Vice Chairman—S. L. deCarteret, president, Canadian International Paper Co., Montreal

Honorary Chairman—Paul E. Cooper, president, Pacific Mills, Ltd., Vancouver, B.C.

Honorary Vice Chairman—Charles R. Whitehead, Montreal

President—R. M. Fowler, Montreal

Technical Section's Activities Reviewed by Douglas Jones

At the annual meeting of the Canadian Technical Section, Douglas Jones, executive secretary, outlined the growth of membership, finances, staff changes, constitution changes, Niagara Falls summer meeting, publications, awards, and branch, committee and educational activities.

Mr. Jones emphasized, particularly, the work of the Sections thirteen committees. During the year, these groups undertook research into many problems of the industry. Some of the problems studied were wood deterioration, the surface oil resistance of paperboard, chemical properties of wood, heating and ventilation of mills, and the recovery of waste materials.

He stressed the value of continued education, both formal and practical, in which members of the Technical Section can assist. He said, "It is our daily duty to assist newcomers to our industry, whether they come from universities, trade schools or other industries, and to inculcate in them the feeling we all have—that we are working in an industry that has no superior."

Technical Section Luncheon

At the annual luncheon of the Technical Section of CPPA, held at Mount Royal Hotel, January 26, D. W. Ambridge, president of Abitibi Power and Paper Co., Toronto, outlined the cooperative efforts of the industry in the field of research and discussed the developments of the past year. He also introduced Dr. L. R. Thiesmeyer, recently appointed president of the Canadian Pulp and Paper Research Corp.

Douglas Jones, executive secretary, Technical Section of the Canadian Pulp and Paper Association

Leading feature at the luncheon was the presentation of the I. H. Weldon Medal, awarded annually by the donor, A. L. Dawe, vice president, Consolidated Paper Corp., Montreal. This award, which is given for the best paper read at the last annual meeting of the Technical Section, was presented this year to H. S. Hill, J. Edwards, and L. R. Beath, director of research, man-

ager of newsprint division, and assistant director of research, respectively, of Price Brothers and Co. Ltd., Kenogami, Quebec, and F. P. Silver, general superintendent, Price Brothers and Co., Riverbend, Que., for their paper on the theory and application of curlated pulp (Cf. P.I. and P.W., Feb., 1949, pp. 1590-1591 & 1664).

The Technical Section service award given to the committee chairman who has rendered the most valuable service to the Section and the Canadian industry during the past year was presented by R. L. Weldon, president, to W. H. Birchard, assistant chief chemist, Fraser Companies Ltd., Edmunston, N.B.

The safest mill in Canada contest is sponsored by the *Pulp and Paper Magazine of Canada*, which awards annually two shields to the paper mills in two classes which have the fewest accidents during the year in proportion to their operating time. J. N. Stephenson, editor-in-chief of the magazine, presented the shields at the luncheon to the two 1949 winners.

Winner of Class A, for paper mills with over 50,000 man-hours per month, was Price Brothers and Co., Ltd., Jonquiere Div., Jonquiere, Que., which had no accidents for 618,543 payroll hours in 1949. The Crabtree Mills Div. of Howard Smith Paper Mills Ltd., Crabtree Mills, Quebec, having also no accidents for 526,243 payroll hours, was the winner in Class B for mills with under 50,000 man-hours per month.

Papers and Discussions

During the three-day meeting, the Technical Section presented more than 25 papers in its various sessions, accompanied by group discussions on many mill and equipment problems.

Session "A"

Chairman—J. A. Hanna

"The Vortrap—as Applied to the Paperboard Industry," H. E. Ingalls, Nichols Engineering & Research Corp.

"Jordon Plug Pressure Control System," Bruno E. Prevost, The Emerson Manufacturing Co.

"Action of Some Formaldehyde Resins on Paper," I. J. Gruntfest and E. M. Young, Jr., Rohm & Haas Co.

Session "B"

Chairman—Dr. J. Edwards

"The Stacom Continuous Roller Press," R. J. Chambers, Anglo-Canadian Pulp & Paper Mills, Ltd., and Dr. K. C. Logan, Northeastern Paper Products Ltd.

"Manufacture of Wrapper from Bark," A. D. Hamilton, The Ontario Paper Co., Ltd.

"Manufacture of Corrugating Board by the Neutral Sulphite Process," J. C. Clare Gain, Abitibi Power & Paper Co., Ltd.

Session "C"

Chairman—E. G. Kirby

"Bleach Plant Instrumentation at The E. B. Eddy Co.," H. Gordon, The E. B. Eddy Co.

"Magnesia Base Sulphite Pulping," R. E. Baker, Weyerhaeuser Timber Co., and Frank Hutton, Babcock and Wilcox Co.

Officers and Councillors of Canadian Technical Section

Standing (L to R): G. A. Franklin, B. Burgess, W. W. Holland, H. C. Lee, W. C. R. Jones, J. Edwards, councillors
Seated (L to R): John Buss, retiring chairman; E. G. Kirby, newly elected chairman; and Douglas Jones, executive secretary

"The Recovery of Heat from Sulphur Burning," Dr. Forestier Walker, Fraser Cos. Ltd., Karl Patrick and Lloyd Hinton, Restigouche Co., Ltd.

Session "D"

Chairman—W. W. Holland

"Newsprint from the Winders to the Pressroom," J. E. Rattray, Anglo-Canadian Pulp & Paper Mills Ltd.

"Small versus Large Grinders for Production of Newsprint Groundwood," T. C. Anderson, Abitibi Power & Paper Co., Ltd.

"Production of Bleached Mechanical Wood Pulp," David W. Peat, student, McGill University.

Session "E"

Chairman—John Buss

"The Waco Filter as a Save-all or Fresh Water Filter," W. P. Nesbitt, Howard Smith Paper Mills, Ltd.

"Modernization of Pulp Screening Equipment at Pine Falls," F. G. Sellers, M. W. Turner and D. O. White, Manitoba Paper Co., Ltd.

Session "F"

Chairman—W. C. R. Jones

"Maintenance Cost Control—The Need for Standardization," D. Ross-Ross, Howard Smith Paper Mills, Ltd.

"Maintenance Cost Control—Some Elements of a Standardized System," A. F. Gurr, Consolidated Paper Corp., Ltd.

"A Suggested Code for Identification of Pulp and Paper Mill Piping," W. H. Young, Howard Smith Paper Mills, Ltd.

Session "G"

Chairman—G. A. Franklin

"The Use and Application of Flame Spectrophotometry in Alkaline Pulp Mill Control," A. E. Richter, J. C. Scarth and A. A. Bernhardt, The KVP Co., Ltd.

"The Application of Statistical Mathematics to Industrial Experimentation," H. G. Burbidge, Provincial Paper, Ltd.

"Consistency Determination of Groundwood Slush Pulp," Sub-Committee on Testing, Physical & Chemical Standards Committee, read by W. E. Patte, The E. B. Eddy Co.

Group Discussions

Alkaline Pulping

(a) Chlorine Dioxide Bleaching of Sulphate Pulps

K. S. Macleod, Associated Chemical Co. of Canada, Ltd.

Board

(a) Drying of Paperboard (based on replies to questionnaire)

(b) Dominion Engineering Vacuum Vat Installed at Price Brothers & Co., Ltd., Jonquiere

C. S. V. Hawkings, Price Brothers & Co., Ltd.

Waste

Symposium of Papers on Waste Sulphite Liquor Evaporation

(a) Evaporation of Sulphite Waste Liquor
Curt Rosenblad, Rosenblad Corp.

(b) Thermal Compression Evaporation of Waste Sulphite Liquor—A Pilot Plant Study
H. Elgee, D. Craig and Dr. J. K. Russell, Northeastern Paper Products, Ltd.

(c) Medium Pressure Steam Concentration of Waste Sulphite Liquor
J. N. Franklin, Bowater's Newfoundland Pulp and Paper Mills, Ltd., and H. O. Goddard, Foster Wheeler, Ltd.

(d) The Removal of Calcium from Sulphite Waste Liquor by Electrolysis
Dr. F. Bender, Forest Products Laboratory

Engineering

Discussion of Maintenance Costing Methods

Fundamental Research

(a) Fibre Motions
Dr. S. G. Mason, Pulp & Paper Research Institute of Canada

(b) Specific Surface of Cellulose Fibres by the Liquid Permeability Method (by title)
Drs. A. A. Robertson and S. G. Mason, Pulp & Paper Research Institute of Canada

(c) Recent Suggestions Concerning the Course of the Degradation of Cellulose by Acids
G. B. Creamer, Pulp & Paper Research Institute of Canada

(d) Progress Report on the Oxidation of Lignin by Sodium Chlorite and Chlorine Dioxide
N. Leviton, Pulp & Paper Research Institute of Canada

Mechanical Pulping

(a) Maintenance Cost Questionnaire—Progress Report

(b) Discussion of Operating Problems

Newsprint

(a) Double Suction Couch (based on replies to questionnaire)

(b) Discussion of Operating Problems

Process Instrumentation

Training of Instrument Mechanics—A continuation of study of on-the-job training giving consideration to methods of training, qualifications of instructors, etc. Introduced with a report from J. N. Franklin prepared from information obtained at Group Discussions held at 1949 Annual Meeting and from other sources.

Board

(a) Effect of Variations in Surface Oil Resistance on Gloss Ink Printing

(b) Discussion of Results Obtained with the Howard Smith Board Creaser

Fine Papers

Discussion of Operating Problems

Heat and Power

Discussion of Bark Pressing

Newsprint and Mechanical Pulping

Panel Discussion of Utilization of Jack Pine

Sulphite

Discussion of Operating Problems

Dinner meeting of Ohio Section of TAPPI, Manchester Hotel, Middletown, Ohio

Dr. Lewis Is Speaker at Ohio Section of TAPPI

▶▶▶ THE REGULAR DINNER meeting of the Ohio Section of the Technical Association of the Pulp and Paper Industry was held January 10 at the Manchester Hotel, in Middletown, Ohio, and was attended by 106 members and guests.

Present at the meeting were two distinguished guests: Dr. Harry F. Lewis, Dean of Students at the Institute of Paper Chemistry; and R. G. Macdonald, national secretary-treasurer of TAPPI. It was recalled that both of these gentlemen were present at a meeting of the Section held some 15 years ago.

Dr. Lewis spoke on "Chemical Byproduces of the Pulp Industry." He developed the thought, of what can be done and what has been done to reduce the hidden tax on each ton of cellulose produced, the tax represented by the other 50 per cent of the wood. In addition to the cellulose, these other materials in wood may be said to represent a tax which pinches, in that they produce difficult waste utilization problems and are a loss of potential profits, if not recovered.

The speaker stated that from two and one-half to three million tons of lignin sulphonate go to waste into the rivers each year in spent sulphite liquors, along with many tons of carbohydrates and other organic and inorganic constituents. He mentioned the number of uses already developed for spent sulphite liquor such as oil for road treatment, vanillin, yeast, and many others. Dr. Lewis said that although sulphate liquors have been used for fuel, many other derivatives also may be developed. Among others, he mentioned the long list of fatty acid derivatives now being prepared, as well as saccharinic acids. The speaker expressed the hope that there may be a more intensive interest in the research and development field as well as in the chemical sales field.

Dr. Harry F. Lewis (standing), Institute of Paper Chemistry, who was guest speaker at meeting of Ohio Section of TAPPI. Seated—(left) R. G. Macdonald, national sec.-treas. of TAPPI; and John L. Clouise (right), Oxford-Miami Paper Co., corres. secretary of the Section

A colored film entitled "Portrait of an Industry," was shown through the courtesy of Calco Chemical Division of the American Cyanamid Chemical Co.

Arthur Thurn (Champion Paper and Fibre Co.), chairman of the Section, presided at the meeting.

NW Div. Supts. Cancels Spring Meeting

The Northwestern Division of The American Pulp and Paper Mill Superintendents Association has cancelled its plans for a 1950 Spring Meeting. The chairman of the Division, L. S. Sabatke, Marathon Corp., Rothschild, Wis., has revealed that the decision was made so that the best possible support can be given to the national convention of the Association, scheduled for June 8-10, 1950, at the Edgewater Beach Hotel, Chicago.

The Association's national president, Charles H. Reese, vice president, Nekoosa-Edwards Paper Co., Port Edwards, Wis., is a member of the Northwestern Division.

Society of American Foresters Elects New President

In a recent mail ballot, Charles F. Evans, assistant regional forester for the southern region of the U. S. Forest Service, was elected president of the Society of American Foresters for 1950-51. Mr. Evans succeeds Clyde S. Martin, Tacoma, Wash.

Clarence S. Herr, resident woods manager of the Brown Co., Berlin, N. H., became vice president of the Society in the same election.

Coming Events

Mar. 22-23—1950 Annual Meeting of Folding Paper Box Association of America; Carton Competition, at the Drake Hotel, Chicago.

Mar. 27-29—National Paper Trade Association, at Waldorf-Astoria Hotel, New York City.

April 4-8—National Production Exposition, sponsored by Chicago Technical Societies Council, Stevens Hotel, Chicago.

April 24-27—Nineteenth National Packaging Exposition, at Navy Pier, Chicago.

May 31-June 2—Summer meeting of the Technical Section, Canadian Pulp and Paper Association, at the Chateau Frontenac Hotel, Quebec City.

June 8-10—Annual meeting of the Superintendents Association, Edgewater Beach Hotel, Chicago.

June 23-24—Joint Meeting of New England and Maine-New Hampshire sections of TAPPI, at Wentworth-by-the-Sea, N.H. Headquarters will be announced later.

Sept. 5-9—Sixth National Chemical Exposition by Chicago Section of the American Chemical Society, at the Chicago Coliseum.

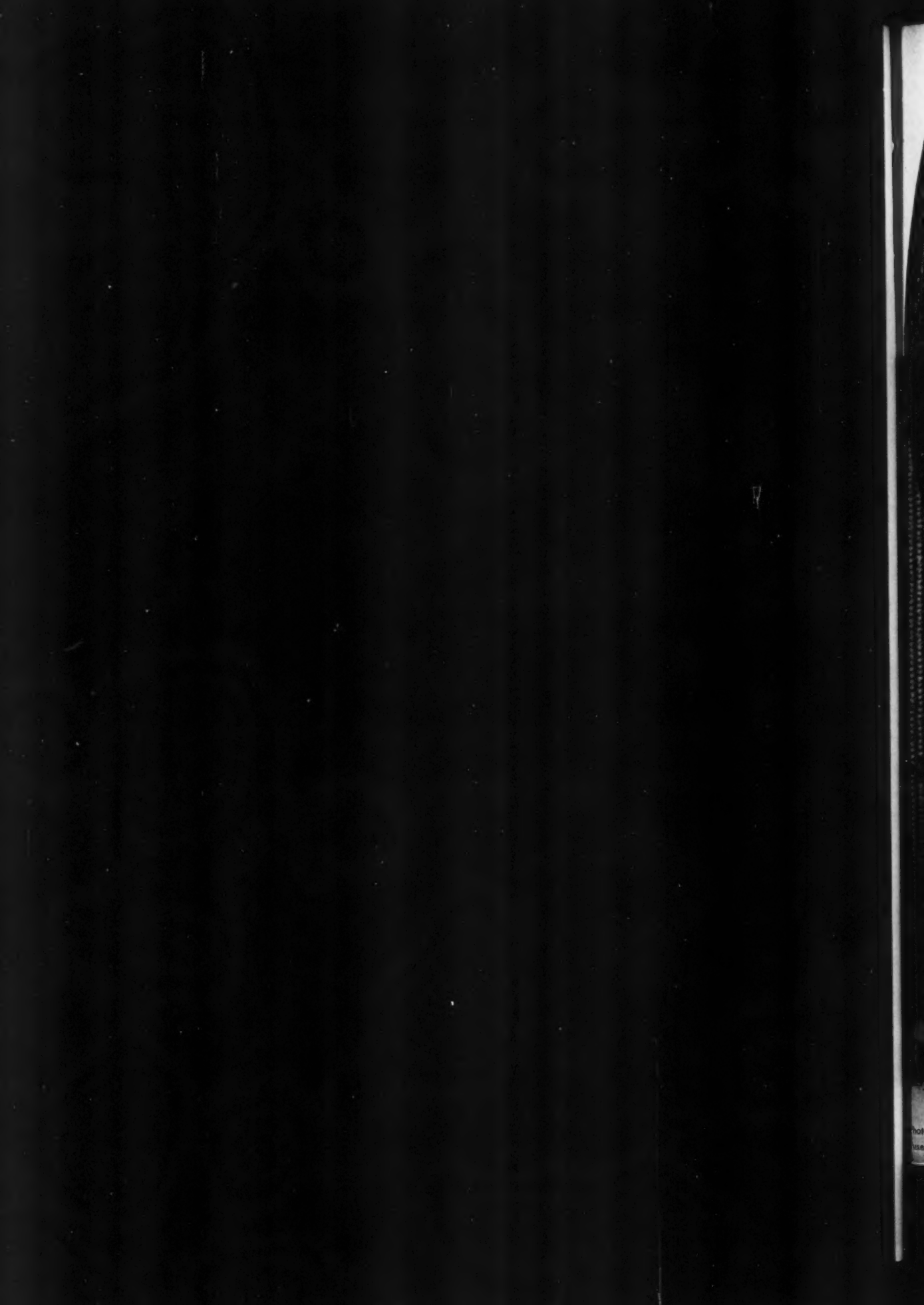
Sept. 18-22—Fifth annual Instrument Conference and exhibit, sponsored by Instrument Society of America, Memorial Auditorium, Buffalo, N.Y.

Oct. 17-19—Fifth annual TAPPI Engineering Conference, Netherlands Plaza Hotel, Cincinnati, O.

STATED MEETINGS

Chicago section of TAPPI meets the third Monday of each month at the Chicago Bar Association, Chicago, Ill.

A group of TAPPI members and friends in Cleveland are sponsoring a series of dinner meetings held on the first Friday of each month during the coming winter. The name chosen for this group is Lake Erie Papermakers and Converters Association.



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No single type of dryer felt will meet the needs of all mills. But HOOPERWOOD "Canvas Engineering" has the answer to that problem—a specific HOOPERWOOD Dryer Felt for each requirement.

If it is a rugged, heavy felt you need for fine finish in normal production . . . or a lightweight, extra-porous felt for faster drying . . . or an Asbestos Felt to withstand advanced temperatures in high speed production of Kraft and other heavy papers—there is a HOOPERWOOD felt to fit your need.

Mill Superintendents find this service invaluable in suiting the particular requirements of their mill—even down to each machine position if desired.

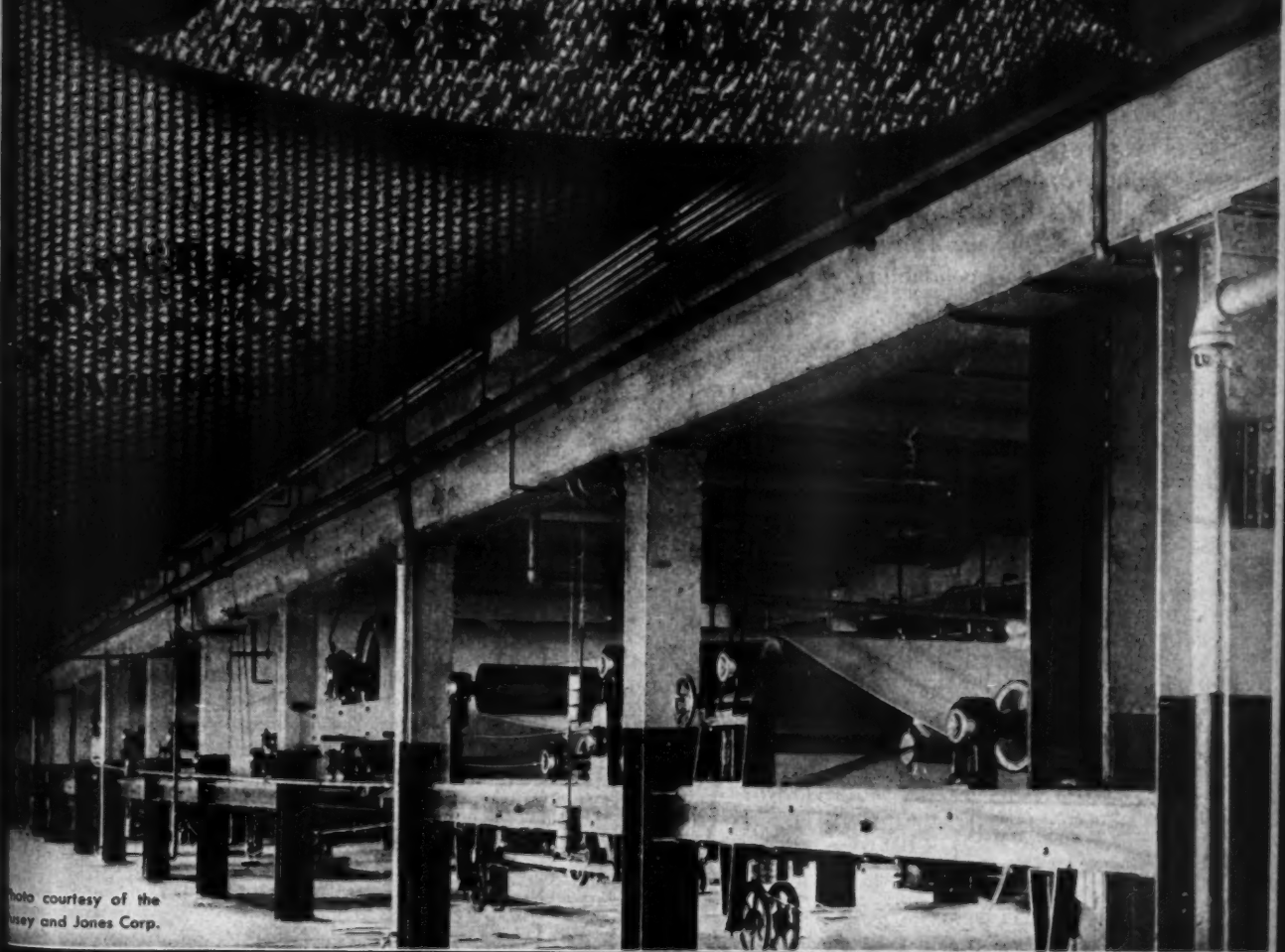
Make your next felt *right*—specify HOOPERWOOD.

WM. E. HOOPER & SONS CO.

New York **PHILADELPHIA** Chicago

Mills: WOODBERRY, BALTIMORE, MD.

Engineered



hoto courtesy of the
usey and Jones Corp.

HOOPERWOOD DRYER FELTS

COTTON AND ASBESTOS

Gruelling tests... *an essential part of every* LUNKENHEIMER VALVE!

RIGID TESTING, far above the usual practice, is regular procedure in the production of Lunkenheimer Valves. From selection of raw materials to final assembly, nothing is left to chance or guess. Each and every operation is gauged to meet the high quality standards which assure dependable performance, longer service life and minimum upkeep.

In gate valves, for example, a Lunkenheimer final test means that *every* valve is tested on both sides, at high and low pressure for seat tightness and then given a careful shell test. Spot testing is not tolerated.

This may be producing valves the "hard way", but for Lunkenheimer, it's the only way since it safeguards our proudest possession . . . the mark of unswerving quality and dependability.

Continually improved testing equipment, together with superior metallurgy and the most modern production equipment assures longer and trouble-free operation, making Lunkenheimer Valves cost less per year of service.

ESTABLISHED 1862

THE LUNKENHEIMER CO.

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Fig. 2150

150 lb. S.P. Bronze Gate

Like three valves in one. Number 2150 Double Disc, or Number 2151 Solid Wedge Disc, Rising Stem; or Number 2153 Single Wedge Disc, Non-rising Stem. How to convert one type to another by a simple interchange of trimmings is fully explained in Circular Number 574 available from your Lunkenheimer Distributor or direct.

Another assurance of better valve service

In the event of valve trouble, you need and can depend upon, quick service from your Lunkenheimer Distributor. His stocks and facilities shorten production tie-ups, save you dollars and hours. Whether it's an emergency, routine maintenance or new installations, phone your Lunkenheimer Distributor for fast, dependable service.

Leadership through Achievement!

The Paper Industry Names in the News

J. D. Zink Elected Board Member by Hammermill Paper Co.

Elected to fill the un-expired term left with the retirement of Harrison R. Baldwin from the Board of Directors of Hammermill Paper Co., Erie, Pa., is John D. Zink, vice president in charge of merchandising.

Mr. Zink, former president of Strathmore Paper Co., West Springfield, Mass., became associated with Hammermill in 1946, was appointed assistant vice president, and became vice president in charge of manufacturing in 1948.

Prominent in the paper industry for many years, Mr. Zink was formerly president of the Writing Paper Manufacturers Association, a vice president of the American Paper and Pulp Association and treasurer of the National Council for Stream Improvement. During World War II, he was a member of the industry committee of both the WPB and the OPA.

Fitzgerald Leaves AWP To Go With Whiting

So that he may become associated with the manufacturing department of Whiting Paper Co., Holyoke, Mass., James T. Fitzgerald recently resigned his position as superintendent of the Gill Division and executive assistant to the president of American Writing Paper Corp., also located in Holyoke.

Mr. Fitzgerald, widely known throughout the industry as an authority on the manufacture of blue print and other technical papers, has been associated with American Writing Paper Corp. since before 1930.

Diamond Match Co. Exec. Appointments

Three executive appointments have been announced by Diamond Match Co. for the company's pulp mill at Ogdensburg, N.Y., which works in conjunction with Diamond's Plattsburgh, N.Y., mill to produce paper napkins and towels, toilet tisue, household waxed paper, plates and moulded pulp food trays.

Donald A. Hunter, superintendent of operations at the Ogdensburg mill for the past five years, is the firm's new resident manager of the Ogdensburg pulp mill. Mr. Hunter came to Diamond's pulp and paper division in 1933 after five years with International Paper Co.

Karl L. Pingrey, associated with Diamond since 1936, has been named general superintendent of the Ogdensburg mill. Before entering the Army in 1943 Mr. Pingrey served as technical adviser and economic adviser and economic analyst in the pulp and paper unit of the U.S. Department of Commerce.

John C. Benny has been chosen as assistant technical director of the division, which is comprised of the Ogdensburg and Plattsburgh mills. Mr. Benny, who has served in technical capacities for a number of Canadian companies, is a senior member of the technical section of the Canadian Pulp and Paper Association.

Pres. Spiegelhalter of Puseyjones Honored on Golden Anniversary

In recognition of half a century of capable and outstanding service with The Pusey and Jones Corp., Wilmington, Del., Andrew G. Spiegelhalter, president of that company, was honored at a dinner given January 19 at Hotel DuPont in Wilmington. Hosts were the directors and officers of The Pusey and Jones Corp. and associated companies.

During the ceremonies which followed the dinner, John P. Pulliam, chairman of the board, acted as toastmaster, and Wm. Merrill Chester, a company director, presented Mr. Spiegelhalter with a silver bowl bearing a fitting inscription for his 50 years of continuous service with the company.

Mr. Spiegelhalter became associated with Puseyjones as an apprentice at the turn of the century—on January 1, 1900. He represented the third generation of Spiegelhalters to enter the employ of this 100-year old firm which built its first two papermaking machines in 1867, and later built machines which set the pace for modern, high speed, large tonnage production of many types of paper.

By 1916, Mr. Spiegelhalter had become plant manager and soon occupied a leading role in the manufacture of the company's papermaking machinery. He advanced progressively to works manager in 1928, vice president in 1932, and in 1938 he also became general manager. The following year he was made president. Under his direction, high-speed machines were built for Fraser Paper, Ltd., Madawaska, Me.; a 234-inch fourdrinier for Southland Paper Mills, Lufkin, Texas, was designed for making newsprint from Southern pine. This was the first machine equipped with the "Rapidrape" method for installing fourdrinier wire.

Andrew G. Spiegelhalter

Mr. Spiegelhalter also took a supervisory role in the development of the First Stream Flow Vat System, and later the first Flow Spreader arrangement which was installed on a kraft fourdrinier machine in the South. The installation also included the first Simplex Press arrangement.

Fontaine New Supt. Pearl City Div. of American Tissue

An employee of American Tissue Mills, Holyoke, Mass., since 1910, Joseph H. Fontaine has been named superintendent of the company's Pearl City Division, located at South Hadley, Mass., to succeed Joseph H. Bach, who

resigned the position in December. Prior to his new appointment, Mr. Fontaine had been a machine tender at the Stony Brook division, another South Hadley mill.

Both of these plants are now on a full six-day schedule, and the company is planning more extensive manufacture of facial tissues. One machine at the Pearl City division has been manufacturing such tissues for over 12 years; Pearl City's second machine is now being changed over to do the same. The two machines at Stony Brook will continue to manufacture sulphite paper for the company specialties, crepe and waxed papers.

Phil Arnold Retires— 41 Years with Garlock

Voluntarily relinquishing his duties as head of the general sales department of The Garlock Packing Co., Cleveland, Phil Arnold will continue his 41 year association with the firm only in his capacity as a vice president.

Mr. Arnold's successor as sales head is Louis Mohn, company district sales manager at Pittsburgh since 1929. Mr. Mohn's appointment became effective February 1, as did that of his successor to the Pittsburgh position, Eugene G. Flannery, heretofore a Garlock sales representative in the Pittsburgh district.

Gardner Transfers Richardson to Sales— Adds Package Designer

An important change in personnel of The Gardner Board and Carton Co., Middletown, Ohio, became effective early in January when Roland W. Richardson was appointed to the company's sales staff.

Mr. Richardson has been a member of the Gardner organization since 1932 when the company purchased the Lockland operating properties of The Richardson Co. Since that time he has been particularly active in personnel work of the organization. Mr. Richardson is very well known in the Pulp and Paper Section of the National Safety Council. For a number of years he has been an active participant in the work of that Group.

In announcing the transfer of Mr. Richardson to the position where he will direct the sales promotion and advertising work of the company, C. H. Avery, sales manager, stated that for some time they have sought a man capable of participating actively in the sales promotion and advertising work of the company. It was felt that his knowledge of company operations fits him for this important responsibility.

Another appointment announced at the same time is that of Robert E. Van Rosen, of New York City, who becomes a development engineer with the Gardner organization. He will develop and design cartons and folding boxes to meet the specific needs of customers. In New York, Mr. Van Rosen was developing and designing packages for his own clientele.

Kellogg and Wilson Elected Fellows by Soc. American Foresters

Royal S. Kellogg, secretary, Newsprint Service Bureau, New York, and Ellwood Wilson, forester, Laurentide Co., Knowlton, Quebec, were among the 11 members of the Society of American Foresters recently elected Fellows.

Seven thousand professional foresters comprise the Society, which chooses for Fellowship, its highest honor, only those members who ". . . are foresters of outstanding achievement as leaders in responsible directive or distinctive individual work of a fruitful character."

Robinson Retires as Wyandotte Vice President

C. B. Robinson, vice president of Wyandotte Chemicals Corp. in charge of the J. B. Ford Division, has retired from his position, although he will continue to serve Wyandotte as a sales consultant.

Active in the distribution of specialized cleaning chemicals and sanitizers for industry and business, Mr. Robinson is widely known in many business groups.

Joining the J. B. Ford Co. in 1917, Mr. Robinson became president of the J. B. Ford Sales Co. in 1929. In 1943, when the Ford company was made a division of Wyandotte, he became vice president of the parent organization.

Hammermill Honors Three Long-Time Employees

Three employees were honored upon their recent retirement from Hammermill Paper Co., Erie, Pa. At a dinner attended by more than 175 fellow workers, Agnes Berkheimer, Elizabeth Berry and Walter Sawford received retirement certificates from Norman W. Wilson, president of the company.

Together, the 3 retiring workers have devoted more than 100 years to the service of Hammermill; Miss Berry, the oldest-in-service woman employee in the history of the company, had been with Hammermill more than 45 years at the time of her retirement.

Duriron Promotions— Baker and Shields

Guy A. Baker

R. Merton Shields

Two personnel promotions have been announced by The Duriron Co., Inc., Dayton, Ohio. Guy A. Baker, for the past several years assistant to the president and secretary of the company, has been appointed vice president in charge of manufacturing. Mr. Baker, associated with Duriron for 20 years, has long been active in metallurgical research and development.

Succeeding Mr. Baker as secretary of the company is R. Merton Shields, formerly manager of Dayton district sales. Mr. Shields, who holds a mechanical engineering degree from Michigan College of Mining and Technology, has been with The Duriron Co. since 1936.

H. S. Colby Now Asst. to Pres. of Springfield Boiler Co.

Climaxing many years of distinguished service in the boiler and steam generating field, H. S. Colby has been selected as assistant to G. R. Atherton, president, Springfield Boiler Co., Springfield, Ill.

Mr. Colby has a wide service record. Formerly associated with Riley Stoker Corp., Worcester, Mass., and Combustion Engineering Co., Inc., New York, his first position, prior to World War I, was with Babcock & Wilcox Co. After 8 years in the Bayonne, N.J., and Barberton, Ohio, plants of that company, Mr. Colby became vice president of United Machine & Manufacturing Co., Canton, Ohio.

When United Machine & Manufacturing consolidated with Riley Stoker Corp., Mr. Colby served the new company for several years as assistant sales manager before devoting a brief period to sales work for B. F. Sturtevant Co.

He left that company to become president of Air Preheater Corp., later consolidated with Superheater Co., which controlled Combustion Engineering Co., which concern assigned him as general sales manager, a position retained until the outbreak of World War II.

Harry G. Davis Now Associated With Oxford Paper Co.

The new general superintendent of Oxford Paper Co.'s Maine Coated Division, Rumford, Me., is Harry G. Davis. Mr. Davis will have complete charge of operations for this division which produces Oxford's enamel coated papers. L. W. McFail, associated with the company for a number of years, at the same time assumes new duties as technical superintendent of the division.

Mr. Davis, the fourth generation of his family to be actively associated with the paper industry, holds a degree in chemical engineering from the University of Maine and has done postgraduate work in mechanical engineering at Trondheim, Norway.

His career in the paper industry includes work in technical and supervisory capacities with Waterfalls Paper Co., Mechanics Falls, Me.; Combined Locks Paper Co., Appleton, Wis.; and International Paper Co., North Tonawanda, N.Y. He has for several years been production manager of the Ozalid Division of General Analine & Film Corp., with plants at Binghamton, N.Y., Detroit, Mich., and Oakland, Calif.

Three Changes Made In Duriron Management

Several personnel changes have occured in the management of The Duriron Co., Inc., Dayton, Ohio. Wayne D. Staley, formerly New York district manager, has been appointed general sales manager with offices in Dayton. Mr. Staley replaces D. E. Jack, who has resigned as vice president in charge of engineering and sales.

R. F. Sharpe, former manager of the Philadelphia office, has been appointed New York district manager, and Ralph L. Watts, formerly a sales engineer in New York, is in charge of the Philadelphia office.

C-Z Managerial Shifts Will Affect Five Men

Several changes in the management of Crown Zellerbach Corp. pulp and paper mills at Lebanon and West Linn, Ore., Port Angeles, Wash., and Carthage, N. Y., will become effective in the near future.

P. T. Sinclair, resident manager at West Linn, has been promoted to staff assistant of manufacturing in the firm's San Francisco headquarters. Mr. Sinclair's successor will be Malcolm Otis, now resident manager at Port Angeles.

The Port Angeles managerial duties will be assumed by Ray Schadt, whose position as resident manager at Carthage will be filled by G. H. Gallaway, currently resident manager at Lebanon, Ore.

Herbert Wymore, now on special assignment at Lebanon, will become acting resident of that mill. It will be several months before all changes are in effect, as moves will be "stepwise," so that each man may spend some time with his successor before taking up his own new position; Mr. Gallaway will be the first to leave his present position.

Clyde Gray Is Now Stowe-Woodward V.P.

C. W. Gray

Leaving his connection with Ford, Bacon & Davis, industrial and management engineers, Clyde W. Gray has now been made executive vice president of Stowe-Woodward, Inc., Newton Upper Falls, Mass.

Mr. Gray has had a wide range of experience and accomplishment in the manufacturing and management fields. In his former connection he served a large industrial clientele, and also functioned as general manager of Ford, Bacon & Davis Co.'s operation at Oak Ridge, Tenn.

A. R. Caspar, associated with Great Northern Paper Co., Millinocket, Me., since 1919, has been advanced to the Directorate of the corporation. Mr. Caspar has long been an executive in the sales department of the firm, having been elected vice president and manager of sales in 1936.

Gustavus J. Esselen has been elected vice president of The United States Testing Co., Inc., Hoboken, N. J. Dr. Esselen will continue in active direction of the Esselen Research Division of the company, a department recently created by the merger of the Esselen Research Corp. with The United States Testing Co., Inc. (Cf. P.I., Jan., 1950)

E. Bradford Hollingsworth and *Paul H. Fretthold,* who began work with National Gypsum Co., Buffalo, N.Y., on the same day 14 years ago, have both been appointed to executive positions by the company. Mr. Hollingsworth has been named production manager in charge of 6 plants, and Mr. Fretthold is now production control manager.

T. Noel Bland has been elected president of Fibreboard Products, Inc., San Francisco, replacing D. H. Patterson, Jr., who recently resigned the position. At the same election the firm's newly-created office of vice president in charge of finance was filled by *R. B. Knott,* former controller, and *Finley Thompson* was elected controller, while *B. R. Colkett* was named secretary.

Curt A. Young has been appointed engineering manager of Riegel Paper Corp., New York. A graduate of Rensselaer Polytechnic Institute and formerly associated with U. S. Rubber Products, Inc., Passaic, N. J., and West Virginia Pulp and Paper Co., he will be in charge of the construction, mechanical, and electrical engineering departments of the company, which will function as one department.

Curt A. Young

Walter T. Baum

Walter T. Baum has been appointed to the Chicago sales division of Wausau Paper Mills Co., Brokaw, Wis. Mr. Baum, a member of the Chicago Club of Printing House Craftsmen, was most recently associated with Carpenter Paper Co., serving as national account representative in Chicago, and formerly was concerned with West Virginia Pulp & Paper Co., Chicago office.

L. P. Littell has retired from Bemis Brothers Bag Co., after more than 40 years service with the company. Mr. Littell, who has been serving the firm in an advisory capacity since 1948, was formerly in charge of the Salt Lake City sales department of the company.

Kenneth R. Bunce, associated for the past five years with American Writing Paper Corp., Mount Holyoke, Mass., as paperboard salesman, has resigned that position to open mill broker offices in Holyoke. Mr. Bunce will represent Mead Board Sales, Inc., Cincinnati; Rocky River Paper Mills, Three Rivers, Mich.; and Alexander Fenton, New York agent for Mobile Paper Mill, Mobile, Ala. Covering the eastern territory, Mr. Bunce will sell regular and specialty grades of paperboard.

Thomas Roy Jones, president of ATF Inc., has been elected treasurer of the CED. Mr. Jones, a member of the executive committee and a trustee of the organization, was New Jersey state chairman for two years, and chairman of the committee's Region III, for two years, as well as national finance chairman for one year.

Kenneth Mairson, former western manager for Falco Corp., has been appointed sales representative of the recently established midwestern branch of E. P. Lawson Co.

George M. Diebold has retired as maintenance superintendent and plant engineer of F. N. Burt Co., Buffalo, N. Y., ending 47 years of association with the firm. Mr. Diebold is a past president of both the Engineers Club of Buffalo and the National Association of Power Engineers.

Don K. Herbert has been designated manager of distributor sales for Falk Corp., Milwaukee. Mr. Lambert, associated with the company for several years, will devote his entire time to personally assisting distributor sales organizations in marketing of the firm's products.

Clarence F. Smith has been appointed vice president and general sales manager of Inland Container Corp., Indianapolis, Ind. Succeeding Mr. Smith as sales manager of the Macon & Eastern division of the firm, with headquarters at Middletown, Ohio, is *Morris Downing.*

J. W. Holmes, former sales service representative for Oxford Paper Co., New York, is now associated with Watervliet Paper Co., Watervliet, Mich., as an assistant in the midwestern territory sales department.

J. K. Vanatta has been named purchasing agent of Nekoosa-Edwards Paper Co., Port Edwards, Wis., to succeed R. S. Holcomb, who recently resigned the position.

Ernest Graheim, secretary and sales manager of Daniels Manufacturing Co., Rhinelander, Wis., was recently elected president of the Wisconsin Paper Group, in an election in which other officers chosen included *Nathan Bergstrom,* Neenah, Wis., vice president; *Leo O. Schubart,* Neenah, Wis., secretary and treasurer; *Irvin Pearson,* Neenah, Wis., executive secretary. At the same time, *L. R. Watson,* Appleton, Wis., and *Oscar Johnson,* Rhinelander, Wis., became new members of the executive committee.

Joseph F. Listzwan, associated with the Chase Bag Co. for the past nine years, has been appointed to the sales staff of the kraft paper and board sales division of St. Regis Paper Co., with headquarters in New York.

Harry W. Davidson has been elected both a board member and secretary-treasurer of Heppenstall Co., Pittsburgh, Pa. Mr. Davidson has been associated with Heppenstall since 1943.

Jack Hall, associated with Minnesota and Ontario Paper Co., Minneapolis, for the past 17 years, has been named sales representative in the southeast and southwest sales territories of the company. Mr. Hall, who fills the vacancy left by the resignation of Ray Strindmo, will be headquartered at Kansas City.

Dennis A. Riordan has been elected treasurer of Hooker Electrochemical Co., Niagara Falls, N. Y., to succeed John F. Bartlett, who retired as treasurer and assistant secretary several months ago. Mr. Riordan first became associated with the Hooker Co. in 1924, as an accountant for the firm; he has since held the positions of chief accountant and assistant treasurer.

The Paper Industry Necrology

Eugene A. Holland

Well known in the paper industry and associated circles, Eugene A. Holland, who conducted his own industrial and technical advertising agency in Philadelphia for the past 21 years, passed away suddenly January 10. He was 49 years of age.

Mr. Holland is survived by his widow.

Ben C. Thomsen, general national sales manager of the Orr Felt and Blanket Co., Piqua, Ohio, passed away in Los Angeles on January 21. Mr. Thomsen had been with the company for 25 years and formerly maintained offices in Chicago. He was 49 years of age.

Robert MacGregor

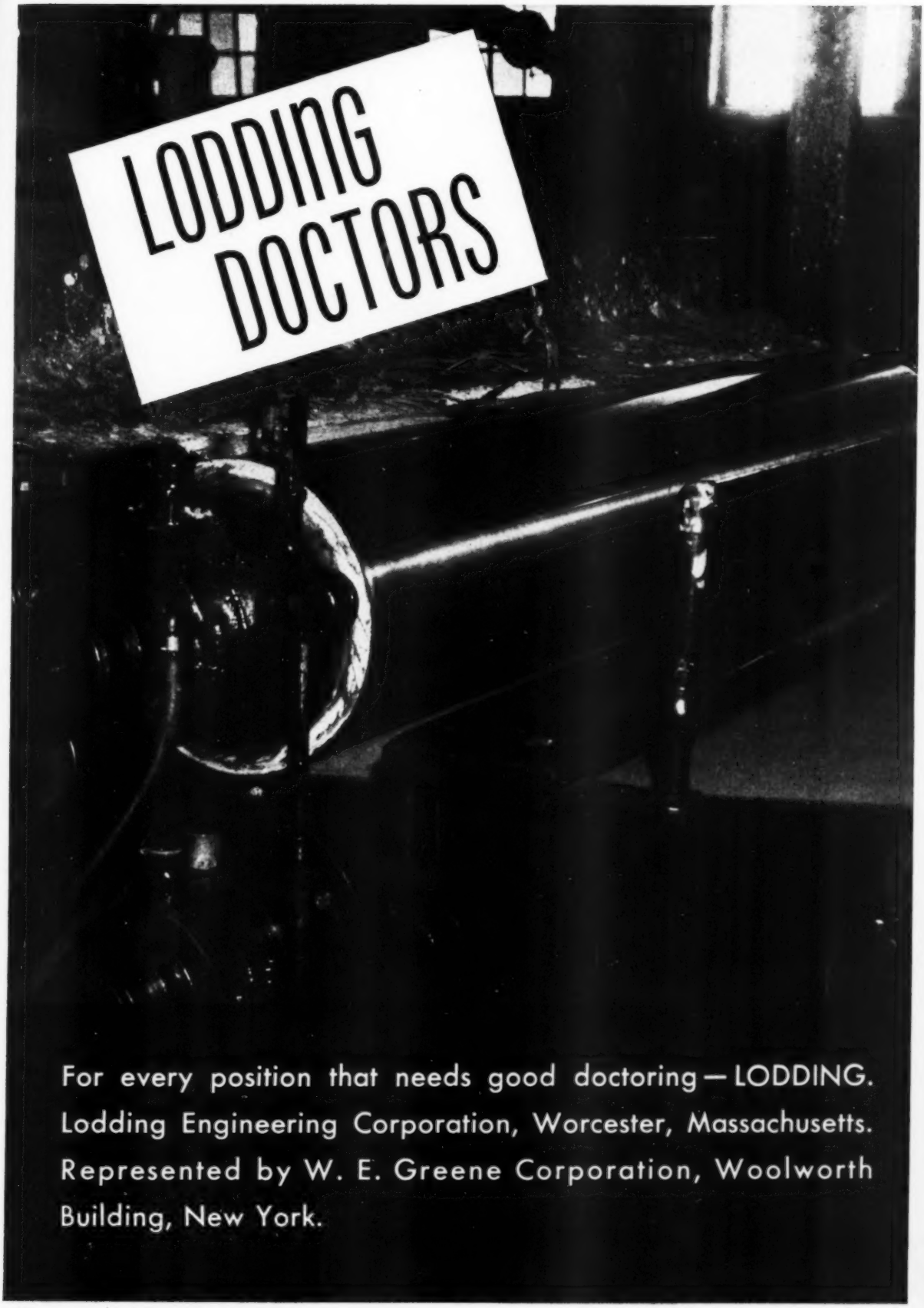
Well known Holyoke, Mass., papermaker and superintendent of the Irving Paper Co., Irving, Mass., Robert MacGregor passed away at his home in South Hadley Falls, Mass. His death, at 79 years of age, followed an extended illness.

Before joining the Irving Paper Co., Mr. MacGregor had been associated with the American Writing Paper Corp., Holyoke, Mass., for a number of years. Born in Edinburgh, Scotland, Mr. MacGregor made his home in Holyoke when he came to this country 60 years ago, changing his residence to South Hadley Falls in 1910.

A widow, two sons and two daughters survive.

Robert Stewart, former general superintendent of the machine shop of Bagley & Sewall Co., Watertown, N.Y., passed away December 29. Mr. Stewart, who had been associated with the company for 41 years until his retirement in 1940, was in charge of the erection of papermaking machines prior to being named general superintendent.

George Bourne, with Harris-Seybold Co., Cleveland, for 30 years, passed away January 17. He was considered an authority on paper-cutting machines, and until his retirement in 1949, he had conducted the well-known Seybold Service School; he had been its only instructor since the school was started.


LODDING
DOCTORS
For every position that needs good doctoring — LODDING.
Lodding Engineering Corporation, Worcester, Massachusetts.
Represented by W. E. Greene Corporation, Woolworth
Building, New York.

The Paper Industry Allied News

Lockport Felt Plans Improvements This Year

Improvements planned for 1950 by the Lockport Felt Co., Newfane, N. Y., include a new $25,000 boiler in a newly remodeled boiler room and a 480-inch loom costing $26,000.

Plans for these installations were announced, together with plans for a new central stairway, additional storage space for yarn, and a new wool dryer, at a Christmas celebration in December. Highlight of this celebration was presentation of the first service pins distributed by the company, including a 40-year pin presented to William H. Lee, president, by his son, Raymond J. Lee, vice president.

Raymond J. Lee, exec. vice pres. Lockport Felt Co. (left), presents to his father, Wm. H. Lee (right), company president, a 40-yr. service pin

Agency & Distributor Div. Formed by G-E

The Apparatus Agency Division of General Electric's Industrial Divisions was replaced by a newly-organized Agency and Distributor division, January 1.

George L. Irvine has been appointed manager of the new division; upon his recommendation R. D. Moore will be assistant manager. They will be responsible for the sale of all General Electric Apparatus Department products through agents and to distributors, wholesalers, and dealers.

Both Mr. Moore and Mr. Irvine have spent their entire careers with General Electric; Mr. Irvine joining the company as a student engineer on the test course in 1930, and Mr. Moore coming in the same capacity in 1936. Both hold professional degrees in electrical engineering.

Cooper Alloy Holds First SS Valve Clinic

Representatives of Pittsburgh's leading chemical and chemical construction firms met January 25 at the William Penn Hotel, Pittsburgh, to participate in the nation's first stainless steel valve clinic. Sponsored by Cooper Alloy Foundry Co., Hillside, N.J., repetitions of the technical dinner meeting will be held in leading cities throughout the country.

George Black, manager of Cooper's public relations division, introduced the speakers, who included the following Cooper men: Mr. Victorine, general sales manager, who discussed "Background for Quality"; P. C. Shaffer, chief engineer, who spoke on "Designing for Long Life and Easy Maintenance"; and J. L. Lessman, manager of Valve & Fitting Division, whose topic was "Competitive Gate Valve Designs."

After a short intermission the meeting closed with an open forum discussion led by James E. Ziegler, Cooper Alloy's Pittsburgh representative.

Hooker Will Expand Its Tacoma Plant

Production facilities for caustic soda and liquid chlorine at the Tacoma, Wash., plant of Hooker Electrochemical Co., Niagara Falls, N.Y., will be increased. The work, which will be done under the supervision of the company's own engineering staff, should be completed in October, 1950.

The expansion of production facilities will be made at a reasonable cost since it consists primarily of rounding out existing facilities. The present buildings will largely house the new equipment, although several building additions will be made.

The expansion at Tacoma is a part of the Hooker over-all program to increase both its eastern and western manufacturing facilities. In the past four years expenditures for this program have cost more than 12 million dollars, largely for additions to and improvements in the Niagara Falls plant.

In co-operation with the Detrex Corp., Hooker is also now building a Hooker-Detrex plant for the manufacture of chlorinated solvents at Ashtabula, Ohio. This new plant is similar to, but larger than, the Hooker-Detrex plant built three years ago at Tacoma.

American Air Filter Is Merged with Herman Nelson Corp.

Merger of American Air Filter Co., Louisville, Ky., and Herman Nelson Corp., Moline, Ill., became effective January 6. The combined company will retain the American Air Filter Co., Inc., title, with the Nelson corporation henceforth being known as Herman Nelson division of the firm, and retaining its offices in Moline. Principal offices and headquarters will be in Louisville.

W. G. Frank, executive vice president, and Richard H. Nelson have been elected directors of the combined firm. Richard H. Nelson and Robert W. Nelson have been elected vice presidents of the enlarged firm, and E. G. Mason, Herman Nelson division, has been elected assistant secretary and assistant treasurer.

The broad diversification of the company's products is expected to be a stabilizing factor in any future business fluctuations. By combining manu-

facturing and engineering techniques, as well as with a co-ordinated sales effort, the new concern hopes to attain a sales record even higher than the combined results of the two individual companies, which was approximately $13,000,000 in 1949.

Ryerson Constructing New Buildings in Cincinnati

Construction has been begun on a new and larger steel service plant and office building for Joseph T. Ryerson & Son, Inc., Cincinnati. The expansion, which is being made to provide larger and more complete stocks of steel and quicker service for the Cincinnati marketing area, is expected to cost more than $1,000,000.

Until the new plant is ready for operation sometime next fall, operations of the company at its present plant at Front and Freeman Streets in Cincinnati will continue, so that there will be no interruptions in Ryerson steel deliveries.

Brown Offers 2-week Instruction Course

An intensive course in the application of controlling and measuring instruments for the manufacturing and processing of pulp and paper will open February 27 at the Brown School of Instrumentation in Philadelphia.

The two-week course will be conducted for industrial instrument engineers and technical personnel from customer mills, and is one of several which have been conducted and scheduled as a part of specialized instruction for industry groups by the Brown Instruments Division of Minneapolis-Honeywell Regulator Co., Minneapolis.

INDUSTRIAL GROWTH of the Gulf States region has prompted Hercules Powder Co. to expand its Dallas, Tex., office of its Naval Stores department. The office, which formerly dealt exclusively in sales and technical service for toxaphene, will now handle the sale of turpentine, pine oil, rosin, and rosin and resin derivatives as well.

WELDER PARTS MAY BE exchanged through a new plan established by The Lincoln Electric Co., Cleveland. Old parts may be traded in for factory wound stators, armatures and certain control parts, in any of the 146 Lincoln authorized Field Service shops in principal cities in 44 states. Standard prices in effect will include trade-in allowances which will reduce the cost for these production line factory parts below the cost of individual local rewinding and repairing.

Architect's drawing of Ryerson's new Cincinnati plant and office building

WHEN A THIRD 50,000-ton furnace went into full operation recently at the Cincinnati plant of Diamond Alkali Co., the firm's production of silicate of soda and related products went up 50 per cent. The new gas-fired unit was installed in the furnace building, which had been appropriately enlarged and remodeled. Total cost of the expansion project was $300,000.

NEWLY CHOSEN Los Angeles representatives of Graver Water Conditioning Co., New York, is Renauld & Co., Los Angeles. The Renauld firm will represent the water conditioning processes manufacturers in southern California, Mexico, and lower California.

THE FIRST STATE to certify shelterbelt woodlots, and the twenty-seventh tree farm state in the country, North Dakota, has 17 different ownerships, totalling 1536 acres, certified as tree farms. The North Dakota Tree Farm Program, launched in Bismarck recently, is sponsored by the School of Forestry and the State Farm Forestry Committee.

New Plant in France for Dewey & Almy

Plans to open a plant at Epernon, France, to manufacture can sealing compounds and other products has been announced by Dewey and Almy Chemical Co., Cambridge, Mass. Conditions in France have improved to such an extent that the company believes sales there can be doubled.

A subsidiary company, to be known as Darex S. A. R. L., has been set up to operate the plant, with G. E. Marin, French banker, as president. Dewey and Almy will receive 51 per cent of the subsidiary's stock.

At the same time, rebuilding of the company's Naples plant, damaged during the war, has been completed and it is now in operation.

A PROPOSED RETIREMENT plan for the 30,000 employees of Allis-Chalmers Manufacturing Co., Milwaukee, is being prepared. The company is also studying improvements in its health and accident plan, along the lines sugfested by the West Allis works Mutual Aid Society. The combined annual cost of the two programs, with other benefits now in effect, is estimated at eleven cents per pay roll hour, for a total of $6,000,000 to $7,000,000.

AWARD OF A $475,000 contract to Cleveland Container Co., Ogdensburg, N.Y., for fiber ammunition containers has been announced by the United States Army. The order is expected to assure continuous operations at the plant, although there will be no great increase in employment.

A NEW SALES OFFICE has been opened by American Brake Shoe Co. at 2620 Maury St., Houston, Tex. William C. George, sales engineer for the southwest territory, will represent the firm's American Manganese Steel, Electro-Alloys and National Bearings divisions in the new office, providing more direct service for customers in this territory.

A NEW FACTORY BRANCH store and warehouse has been opened by Link Belt Co., Chicago, at 2630 Holmes St., Kansas City, Mo. The branch was necessitated by expansion of the firm's business in the area.

The Paper Industry Safety News

The Safety Banquet, given by Ward Paper Co. to celebrate its "safest year," was attended by 235 employees and their wives. The company is now in its 15th no-accident month

Speakers at the banquet were: Cecil Taylor, mill supt.; D. B. Smith, company president; Fred Braun, Employers Mutual Ins. Co.; Alwin H. Koebe, safety director, and Wm. Pennell, Employers Mutual

Ward Paper Co. Celebrates 15-Month Perfect Safety Record

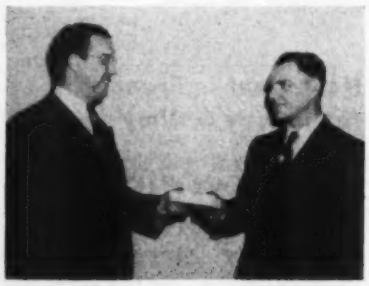
▶▶▶ "Ward Paper Company's Safest Year" was the theme of the banquet and party held January 22 in Merrill, Wis. Two hundred thirty-five persons attended the banquet given by the Ward Paper Co. for employees and their wives in appreciation of the perfect 1949 safety record, when operations continued for a full year without a single lost-time accident.

The co-operation and efforts of all employees were praised by D. B. Smith, president of the company. He urged a continuance of the spirit necessary to prolong this perfect record which is now in its fifteenth month. President Smith paid particular tribute to Alwin H. Koebe, company safety director, whose leadership was instrumental in the effectiveness of the safety program. He presented Koebe with a pen and pencil set as a token of the company's appreciation.

Principal speaker at the banquet was Fred Braun, vice president in charge of engineering of the Employers Mutual Insurance Co., of Wausau, Wis. In complimenting the workers on their fine record, Mr. Braun repeated that accidents do not just happen—they are usually caused by carelessness or poor judgment. Mr. Braun also took the opportunity to warn the wives present of the necessity of guarding against accidents in the home, adding that statistics would indicate that their husbands were safer while working at Ward Paper Co. than they were while at home.

Other speakers included Cecil Taylor, superintendent, W. H. Relyea, night superintendent, William Pennell, safety engineer for Employers Mutuals, and Mr. Koebe, who was also in charge of arrangements for the program.

Several fine musical selections were offered by a group of girls from Holy Cross Academy in Merrill. The remainder of the evening was spent at a dance sponsored by the company at the local American Legion hall.



D. B. Smith (left), Ward Paper Co. president, presents pen and pencil set to Alwin H. Koebe, company safety director

THE ACCIDENT RATE in Ontario, Canada, mills has been reduced from 50 to 1,000,000 man-hours in 1929 to 19 man-hours in 1949, according to Douglas Chant, manager of the Ontario Pulp and Paper Makers' Safety Association. Mr. Chant commented that if the rate had remained as it was in 1929, 170 more men would have died, and 27,444 more would have had serious disabling accidents.

Westinghouse Group Wins "Safety Oscar"

A record of more than 2,600,000 man-hours of work without a lost-time accident recently earned 425 Westinghouse Electric Corp. employees a "Safety Oscar" in honor of the achievement.

Employees of the company's tool and special equipment department of the Westinghouse Feeder Division, East Pittsburgh, Pa., received the trophy at a noontime ceremony in which Paul M. Matthews, superintendent of the department, accepted it in their behalf from W. A. Beatty, manager of the division.

Nearly three years have elapsed since April 17, 1947, when the tool and special equipment department had its most recent lost-time accident. Mr. Matthews commented that theirs could easily be a hazardous department, since it requires virtually every machine function known, and that a safety record such as this is the result of mutual understanding of responsibility and observance of safety rules on the part of every employee working in the department.

"Comic Books" Will Tell Story of Utility Safety

Fawcett Publications, Inc., has been appointed by Ebasco Services, Inc., New York, to create a new booklet series designed to carry the story of utility safety work as it concerns the public to mass audiences.

The artist and the script writer who do the "Captain Marvel" comic series are doing the work on the new Ebasco booklets, using the same comic book techniques. Although the greatest emphasis of the booklets will be upon the general subject of safety, the advantages and superiorities of the American way of life will also be stressed.

Paper Industry Safety Scores

▶ THE LOWEST monthly rate recorded in the Paper Industry Safety Contest was that of November (1949) when the frequency rate for all mills reporting dropped down to 8.66. Contributing to the improvement were lower rates for both contest divisions and all size groups except Group D in Division I.

The following thirty-six mills finished November with perfect scores. December scores will close the 1949 Contest:

Division I—Paper and Pulp Mills

Group A (None)

Group B

National Container Corp. (Kraft Pulp Mill), Jacksonville, Fla.
West Virginia Pulp & Paper Co., Williamsburg, Pa.

Group C

Marathon Corp., Menominee, Mich.
National Vulcanized Fibre Co., Yorklyn, Del.
Price Bros. & Co., Ltd., Jonquiere, P.Q., Canada.
Congoleum-Nairn, Inc., Cedarhurst, Md.
National Vulcanized Fibre Co., Newark, Del.

Group D

Container Corp. of America, Carthage, Ind.
Crown Zellerbach Corp. (C-W Paper Div.), Lebanon, Ore.
Mead Corp., Harriman, Tenn.
Mead Corp. (Wheelwright Div.), North Leominster, Mass.
Armstrong Cork Co., Pensacola, Fla.
Marathon Corp., Ashland, Wis.
U. S. Gypsum Co., Oakmont, Pa.
Strathmore Paper Co. (Mill No. 1), Woronoco, Mass.
Ward Paper Co., Merrill, Wis.
Fort Wayne Corrugated Paper Co., Vincennes, Ind.
Hollingsworth & Whitney Co., Madison, Maine.
National Gypsum Co., Newburgh, N. Y.
Riegel Paper Corp., Riegelsville, N. J.
Spaulding Fibre Co. (Hayes Plant), No. Rochester, N. H.

Division II—Paper and Board Remanufacturing

Group A (None)

Group B

Marinette Paper Co., So. Glens Falls, N. Y.
National Container Corp. (Container Div.), Jacksonville, Fla.

Group C

Fibreboard Products, Inc., South Gate, Calif.
Kimberly-Clark Corp., Appleton, Wis.
Container Corp. of America, Baltimore, Md.
Bird & Son, Inc., Shreveport, La.
South West Box Co., Sand Springs, Okla.
Pillsbury Mills, Inc., Wellsburg, West Va.
Certain-teed Products Corp., Kansas City, Mo.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Certain-teed Products Corp., Buffalo, N. Y.
Flintkote Co., Hollywood, Calif.
Bay West Paper Co., Green Bay, Wis.
Lloyd A. Fry Roofing Co., San Leandro, Calif.
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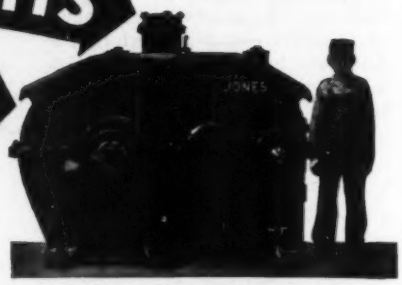

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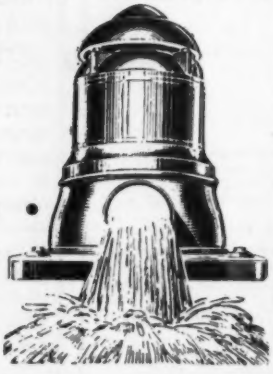

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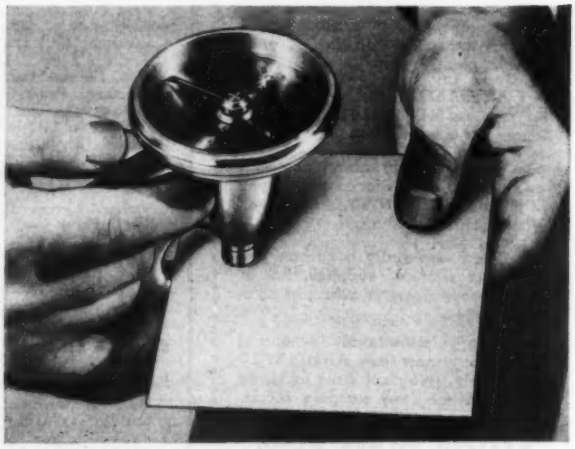

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The Paper Industry Practical Shorts

Battery Readings Must Be Corrected For Temperature

To obtain accurate specific gravity readings of batteries, correction of specific gravity must be made on the basis of plus or minus three points of gravity for each 10 F. (electrolytic temperature). Using 77 F. as a base, three points of gravity are added for each 10 F. above base and three points subtracted for each 10 F. below. As the temperature of the acid rises, the acid expands and is, therefore, not as dense. The hydrometer float then rides low, giving readings lower than normal. Conversely, when the acid is cold, the float rides high and the reading is higher than normal. The following are examples of how this correction factor is applied.

Hydrometer Reading	Thermometer Reading (deg. F.)	Correction	True Sp. Gr.
1.250	87	plus 3	1.253
1.210	80	plus 1	1.211
1.180	64	minus 4	1.176

Some thermometers, specially designed for battery application, are scaled to permit ready correction of gravity readings. Adjacent to the regular temperature scale is a second column of figures, preceded by a "plus" sign above 77 F. and a "minus" sign below. Reading the figures at the mercury level ascertains the amount of correction necessary. Thus, if the hydrometer reading is 1.260 and the second scale on the thermometer indicates plus 8, the true specific gravity is 1.268.—GOULD STORAGE BATTERY CORP., Trenton, New Jersey.

Always Keep that "Ounce of Prevention" Handy

A beater helper was using an iron bar borrowed from a millwright to pry open the door of a metal stock box. The bar slipped, and he fell against the sharp edge of the box and lacerated the muscles of his right arm.

The bar should have been taken out of service.

Maintenance crews should have been called to loosen and repair the door.

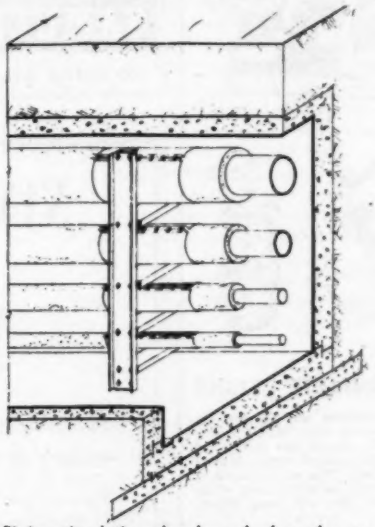
A blowpit helper was burned by steam escaping from around the edges of doors. He did not see that the doors were securely wedged *before* blowing the digester, but was securing the wedges in place to hold the blowpit doors *closed after* starting to blow.

How to prevent a recurrence: Crews must be instructed on the importance of securing door wedges before blowing.

—From the *News Letter*, published by Pulp and Paper Section of the National Safety Council.

Reduce Heat Losses

Heat losses due to direct metal-to-metal contact between hot pipe surfaces and structural supports may be prevented by using insulated supports. Developed by Sargent & Lundy, engineers, from test work done at the University of Illinois, insulation of the entire length of piping is made in the usual manner and the pipe then supported by hangers or by channel irons.



Piping, insulation, bands and channel supports, as installed in underground conduit at the University of Illinois

Where the piping is to be supported by a hanger, a No. 10 gauge steel plate, its length proportioned to the load to be carried, is rolled into a band to fit the insulated pipe and provided with a flange for assembly. A saddle plate, 3/8 inch thick, is then tack welded around the lower half of the flanged band, to assist in carrying the direct load and in spreading it over a wide area. The unit is then bolted in place around the insulated pipe, a filler bar is fitted over the upper half of the flanged band, and the usual hanger strap is fastened around the entire assembly.

Where the pipe line is to be supported by channel irons, a 16-gauge sheet metal band, 18 inches long and flanged for assembly, is bolted around the insulated pipe at each point of support.

Since the pipe rests on the insulation at the supports, the insulating material used must be able to bear the weight of the pipe. On the basis of the tests conducted at the University of Illinois, a loading capacity of 10 lb. psi or 100 lb. per running in of line, has been established for 85 per cent magnesia. — THE MAGNESIA INSULATION MANUFACTURERS ASSOCIATION, Washington, D. C.

Best Way to Clean that Hardened Paint Brush

Many years ago this author had an article published in which it was suggested that stiff and hard paint brushes be "hammered" with a hammer, being careful not to ruin the bristles. That treatment is rather severe, especially if the brush is an expensive one. But owners of expensive brushes are not in the habit of allowing them to become hard.

Recently, this question was asked: "How about nylon brushes?" After which, the author did some investigating. He wrote to all of the leading manufacturers of paint brushes, receiving 1, 2, 3 suggestions by brush manufacturers.

Nylon Brushes

(1) Soak for four or five hours in sodium-phosphate. This will tend to loosen the hardened paint. Then wash the brush in hot soap and water and allow to dry.

(2) There are several commercial cleaners available on the market, some of which you will find satisfactory for this work.

(3) Soak in benzine or turpentine. Work the brush in this solution every so often in order to break up the hardened paint. Wash thoroughly in warm soapy water. Then wash out the soap with clean warm water. Allow to dry.

Bristle Brushes

(1) Wash in hot soap and water and scrub on an ordinary scrubbing board. This will remove every bit of paint from the bristles.

(2) Use paint and varnish remover, leaving the brush immersed long enough to soften the hard heel. Then soap and water and a hand scrub board.

(3) Same as 3 for nylon brushes.

(4) Use either a powdered brush cleaner, following directions on the package, or one of the newer liquid brush cleaners.

—W. F. SCHAPHORST, M.E.

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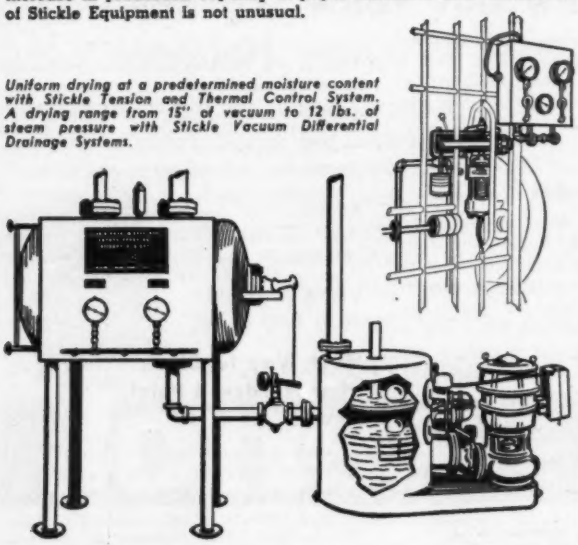

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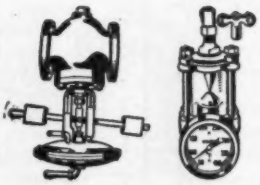

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Sheet Density Vs. Freeness

Published here is a letter written by James d'A Clark, Research and Development Engineer, Longview, Wash., to the secretary of the Australian Pulp and Paper Industry Technical Association, South Melbourne, Australia. The letter is published with Mr. Clark's full permission.—EDITOR

"So much excellent work has been done in Australia on beating and refining problems that it seems a pity that the suggestion to compare results on a basis of sheet density rather than freeness is not more widely accepted.

"May I suggest that those who believe that freeness is a valid measure of 'degree of beating' or 'hydration,' carry out the following simple experiment which only takes a few minutes in a paper mill:

"Take some raw pulp and some mill-prepared stock from the machine cheat and obtain their freenesses in the usual way. For example, with Southern Pine Kraft I obtained freenesses of 760 and 550 cc. on a Schopper Riegler with a 5 gm. sample from a machine making liner board. Then, make another freeness test with the raw pulp, but instead of using fresh water for diluting the sample to 1000 cc., use white water caught from beneath the fourdrinier wire. In my case, I got a result of 345 cc. In other words, the simple addition of white water immediately imparted to the raw pulp a high degree of beating, in fact a splendid kind of hydration—the kind without cut fibers.

"Unfortunately, burst tests made on sheets prepared from the raw pulp, with and without white water, showed no significant difference.

"To indicate how important is the choice of a basis of comparison of stock, compare the conclusions of A. J. Laugher from the Table II on page 171 of Vol. II, part of which was reproduced on page 732 of *The Paper Industry and Paper World* of Sept., 1949, with those deducible from figures in Table out of recent data from Southern Pine Kraft obtained in accordance with TAPPI standard methods. The 3 stocks are compared at a density of 6.65 g/cc., which is equivalent to a fairly good degree of beating for this pulp for board.

"My objection to the use of a miniature beater for treating pulp for testing is simply that it is utterly impossible to standardize a sharp cutting edge. The edges can't be rounded because even with the normal sharp edges, unless the consistency of the pulp is lowered to about 0.7 per cent and the normal roll pressure doubled (which procedure would quickly change the cutting edges), a miniature beater can't simulate the cutting action of the massive mill machines. The reduction of freeness which is secured is the result of gently fibrillating every fiber, and separating some of the particles, whereas in practice the main cause of the freeness test going down with beating is the production of very fine debris derived from the smashing apart of only those fibers hit by the massive bars of the mill equipment.

"The laboratory kollergang simulates the heterogeneous cutting action of the heavy mill equipment; however, the smashing action is absent to produce enough debris to affect the freeness very markedly, but it nevertheless does produce a stock which is fairly close to mill beaten pulp as far as tangible sheet characteristics are concerned. Obviously, if one wanted to simulate the action of laboratory beaters or refiners, which, it should not be forgotten, are highly arbitrary and unique pieces of equipment, all one would need to do to a laboratory kollergang would be to greatly reduce the weight of the rolls. This would make a cheaper and nicer instrument in many ways and would, because of the higher strength and lower freenesses developed with pulps, make the majority of investigators feel much happier with it. However, it would no longer then be an honest offering even though it would, as it admittedly does now, outperform every other piece of laboratory equipment for reproducibility."

Supt. Read of Australian Newsprint Mills Pays Visit to U.S.

In a published article, W. D. Read, technical control superintendent of Australian Newsprint Mills, Ltd., Boyer, Tasmania, described his recent trip to the West coast of Canada and portions of the United States, praising the courtesy shown him by executives and technicians of the various plants and organizations which he visited.

Mr. Read was very impressed with the production methods used in American mills. He visited the Bloedel, Stewart and Welch kraft mill on Vancouver Island, made a brief stop at Longview Fibre Co., Longview, Wash., toured the pulp division of Weyerhaeuser Timber Co., and then met executives at Crown Zellerbach, Camas, Wash., where he viewed the Morden stockmakers of the company.

At Neenah, Wis., Mr. Read was the guest of the Kimberly-Clark Corp., which is acting as technical manager of the Coosa River project. Other plants and mills at which he was a guest include: The Mead Corp., Chillicothe, Ohio; Champion Paper & Fibre Co., Canton, N. C.; International Paper Corp. kraft mill; Holingsworth and Whitney, and Mobile Mill Co., all of Mobile, Ala.; Champion Paper & Fibre Co., Pasadena, Tex.; Southland Paper Mills, Inc., Lufkin, Tex.; Brown Paper Mill Co., Inc., Monroe, La.; integrated lumber and pulp project at Crossett, Ark.

Norway To Have New High-Speed Paper Mill

A pulp and paper company near Kristiasand, Norway, is reportedly planning installation of a new, high-speed paper mill, equipped with a machine manufactured in the United States. Designed to make air mail, silk, and lightweight correspondence paper, the mill will have a guaranteed speed of 1,200 ft. a minute and will be the fastest of its kind in Scandinavia. The same company has the only continuous cooker for chemical pulp in Norway.

Production Up In Peruvian Mills

Peruvian paper mills report that production was maintained at near capacity levels during the third quarter of 1949. Production in the fourth quarter was expected to increase somewhat in view of the arrival of sufficient pulp supplies to furnish the mills' requirements during the quarter.

Production of multiwall paper bags showed a further increase, reflecting a greater demand by the sugar mills which have largely eliminated jute and cotton bags for packing sugar for domestic consumption. Corrugated containers also were in demand by industrial concerns.

Production of bagasse pulp during June, July, and August totaled 3,080 metric tons, a monthly production rate which exceeded by about 17 per cent the rate during the first 5 months of 1949. (From *Foreign Commerce Weekly.)*

THE NEW Algerian paper mill in Baba-Ali, Algeria, has begun the continuous operation of one machine which produces 20 metric tons of paper daily. This will be augmented soon by another machine which is expected to increase total production to 35 to 40 tons daily. The mill manufactures high quality book paper from esparto grass. (From *Foreign Commerce Weekly.)*

Foreign Abstracts . . . . . .

Compressibility of Newsprint

A study was made of the compressibility of newsprint, because newsprint rolls are forced to resist heavy pressures during transport and storage. These are the experiments conducted at the Hallsta mill at Hallstavik. At first, tests were made on actual newsprint rolls under heavy loads. Two rolls were placed on a concrete floor and, on top of each roll was placed an I-beam of the same length as the roll. A calendar roll (weighing 8800 kilos) was then lowered slowly on the eye beams, so that the load on the paper rolls was evenly distributed. Diameter changes in either roll could then be measured to 0.01 mm. (by means of micrometers installed both on the core and on the roll).

After about a week, equilibrium was reached. The load was then removed and the roll allowed to "expand" for a week until equilibrium was again reached. The entire process of loading and unloading was then repeated. The roll cores (which were free from plugs) showed no deformation. On the other hand the rolls themselves showed a permanent deformation which could be accurately measured and which was surprisingly constant. Thus two satisfactory rolls showed deformations of 0.62 and 0.63% whereas a roll "rejected for softness" showed a 0.70% deformation.

The rolls were also tested for shock resistance, and the edges were found very sensitive. Practical tests were made by dropping rolls from a height of 10 feet to a concrete floor on which they bounced like huge rubber balls. From an analysis made of the curves resulting from compression measurements, three different types of dimensional change were noted:—permanent deformation (a measure of the irreversible *secondary creep*), reversible *primary creep*, and the purely *elastic compression* (which followed Hooke's law).

Following these preliminary runs, an apparatus was devised for measuring the behavior of paper during compression. It was termed a "pressure balance" and is fully described and illustrated. It has a capacity of two tons and a device for pressing a pile of paper against the balance, by means of a piston which is connected with a screw by a ball and socket. Thus the piston itself moves *without rotation* up and down within a cylinder which stands on the platform of the balance. The cylinder contains a pile of paper 30 cm. high and of definite area and conditioned to a moisture content of 10%. The pile can be compressed by a turn of the wheel. The piston pressure is determined by weighing, using a platform scales (previously used in weighing scrap iron!); 20 kilo weights sufficed to give a pressure of 2000 kgs. The maximum specific pressure on the pile is 20 kgs./cm^2. Inasmuch as the highest pressure to which newsprint is exposed on printing presses is approximately 55 kgs./cm^2, the test is a satisfactory one.

The balance is illustrated and its operation is described in detail. Graphs were obtained by testing newsprint and these were interpreted by applying Steenberg's mechanical paper model (which appears applicable to paper compression as well as strain). These interpretations and their significance are discussed very fully. The effects of moisture on compressibility was investigated. Two papers which showed very similar qualities at 6% moisture content showed marked differences at 10% moisture. Not only were different types of newsprint tested for compressibility, but a sample (from a specific mill) was taken once a week for a period of two months.

Both the pulp and resulting paper were analyzed by every method known and used in the mill laboratory, but only freeness and "Bendtsen hardness" proved of any interest in connection with compressibility. Methods for measuring this hardness are fully described. Freeness and secondary (irreversible) creep are closely correlated, thus verifying the opinion that a high freeness gives a soft paper (and vice-versa). Primary (reversible) creep appears to be relatively constant, and is apparently influenced by the wood used. Thus spruce and balsam, respectively, led to newsprints with differing primary creeps. There appears to be a marked correlation between elasticity of the paper and Bendtsen hardness (as measured by the Bendtsen smoothness tester). The results are fully discussed in the light of production control. The effects of compressibility on ink sorption and "strike-through" merit further study. Thirteen figures, two tables, but no references are given. Gunnar Gavelin, *Svensk Papperstidn.* 52, No. 17, 413-19 (1949). (In English).

Rheology of Paper

This is an abstract of two papers taking up the general principles of rheology and its practical significance. Rheology deals with the behavior of matter when it is subjected to mechanical deformation. In general, it studies the relationship between stress, strain and time. Both (a) fundamental and deductive methods and (b) empirical and inductive methods are used. In (a) the behavior of matter is considered from first principles, and deductions are then made regarding the behavior of specific materials, by inserting the special characteristics of these materials in general equations.

Such deductions are then confirmed by experimental observation. The deductive methods (a) cannot as yet be rigorously applied to the rheology of paper. In the case of methods (b), the behavior of a particular material is observed experimentally, and subsequently these observations are subjected to inductive methods of reasoning, whereby fairly general principles of rheological behavior of materials are developed from the behavior of the specific materials studied. The two main subdivisions of (b) are the so-called integral and the analytical methods, both of which are described. At present, only the analytical set of methods (in which the over-all behavior is split into a sum of simpler component units) appears to be available in the study of the rheology of paper.

The rheological method is a technique in which the mechanical properties of the paper are studied in detail, *while the paper is still doing useful service*. This is in contrast to routine paper testing. A complete study of the behavior a paper under stress and strain carried out with the aid of modern knowledge of high polymers is needed to permit a radical development in the present day testing technique which is a half century old. Stress-strain studies are of importance to the practical papermaker, but relatively few paper technologists are at present concerned with rheology. The author gives examples of results on the viscoelastic properties of paper given by using rheological techniques (which could not have been obtained readily by routine testing). The fact that the mechanical behavior of so many (apparently) different materials is similar indicates that there may be a common denominator by which all these materials can be judged. The effort to collaborate with rheologists outside of the field of paper technology is advocated. Alfred H. Nissan. *Paper-Maker*, (London) 118, No. 4, 259 (Oct., 1949) and Börje Steenberg, *Ibid.* 258-9 (1949).

Pressure Hydrogenation of Sulphite Waste Liquor

Pressure hydrogenation of aqueous alkaline sulphite waste liquors was carried out at 350 C. and 340-80 atmospheres (initial) hydrogen pressure without addition of catalysts. However, the reaction appears to be catalyzed by the walls of the autoclave which were made of steel containing nickel and chromium (and termed "VzA steel"). Evidently steels containing over 11% chromium have a marked catalytic action. Nickel plus chromium in the steel also serve as catalysts. Silver is a poor catalyst and so are steels low in nickel and chromium.

When a ratio of four parts sodium hydroxide to five of lignin was used, good hydrogenation resulted. The mixture became much lighter in color, and various neutral products, phenols and acids were obtained. The ratio of these products to each other varied with the conditions of the reaction. Thus at low alkali concentrations (less than 10%) the yield of neutral bodies was favored. Above 10% alkali, acids formed the chief product (especially when the steel autoclave was low in nickel and chromium). Interestingly enough the hydrogen consumed in this reaction was not due to compressed hydrogen alone. One third of the hydrogen stems from the (dehydrogenation) alkaline conversion of alcohols into acids.

The sulphonic acid groups of the lignin are largely eliminated as sulphites. This is shown by the lively evolution of sulphur dioxide, when the hydrogenation mixture was acidified. However, a small fraction of this group is removed in the form of sulphates, sulphides and thiosulphates. The lignin portion of the original sulphite waste liquor gives rise quantitatively to ether soluble products. Of these about two thirds can be distilled and are liquids at ordinary temperatures. On pyrolysis over 50% of the phenolic portion of the lignin is converted into liquids. The author gives four tables, nine references and nine figures. Walter Stumpf. *Angew Chem.* 61, 400-405 (1949). (In German).

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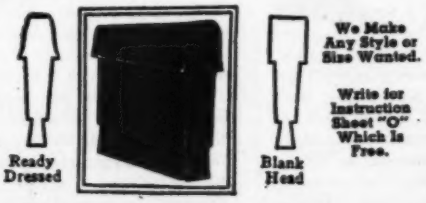

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Straw Utilization in Western Europe's Pulp and Paper Industry

DR. JOSEPH E. ATCHISON
Asst. Chief for Pulp and Paper
Forest Products Branch ECA
(Washington)

This is the second and final installment of Dr. Atchison's article. Part I, with map and itinerary, appeared in the January issue of THE PAPER INDUSTRY.

V.—Developments in Belgium

The utilization of straw for the production of pulp and paper in Belgium is confined to the production of low quality strawboard. At the time of the writer's visit, there were four such mills in operation with total production of about 15,000 tons of strawboard per year. The equipment in these mills is very old and obsolete and production methods have not been improved for fifty years.

The cost of production of the strawboard in these mills is twice the cost of production of the same grade of board in the Netherlands although the raw material costs are about the same, and the strawboard mills in the Netherlands are far from being modern. Until recently, the Netherlands Strawboard Association had agreed not to sell their board in Belgium at prices lower than the Belgian board producers could meet. However, with the formation of Benelux coming more and more into being, the Netherlands mills have now started to sell their board in Belgium at prices as low as $50 per metric ton. Belgian producers claim that their costs of production amount to almost $100 per ton. Thus it appears very likely that the Belgian strawboard mills will either be forced to modernize and improve the efficiency of their operations or suspend operations in this field in face of the competition from the Netherlands mills.

The strawboard is converted into corrugated and solid fiber boxes for use as shipping containers. To improve the appearance and strength of the boxes, various grades of paper are laminated to the strawboard. By using various combinations of different types of paper with the strawboard a great variety of types of boxes are produced.

VI.—Developments in France

A. The Use of Straw and Other Agricultural Residues

It was surprising to learn that the use of straw in the French pulp and paper industry has been confined mainly to production of paperboard and rough quality wrapping paper. There are a few mills which produce bleached straw pulp in small quantities for their own use, and additional mills expect to construct plants for the production of bleached straw pulp on a larger scale in the future. However, most of the increased use of straw contemplated for the future is for corrugated boxes and not for higher grades of paper. Neither the Federation nor the Pulp and Paper School had any reliable information on the actual plans of the mills to increase the production of bleached straw pulp for use in finer grades of paper.

The staff at the school did not know of any serious work being done on the use of bleached straw pulp, but the Federation had production data showing that four small mills are now actually producing and using such pulp. Discussions with mill executives revealed the fact that the mills themselves are conducting research and development work on use of straw in their usual secretive manner, thus there has been very little exchange of information on it. At least six companies have indicated their intentions to build facilities in the future for production of bleached straw pulp in sizable quantities. These companies have been studying the relative merits of the processes now being used in other countries. Some of them favor the "Celdecor" process while others favor the monosulphite process as offering the greatest advantages under the conditions prevailing at the respective mill locations.

At the present time, unbleached straw chemical pulp is being produced by 19 mills which make a total of about 25,000 metric tons of this product per year. It is used mainly in mixtures with unbleached wood pulps and wastepaper in paperboard and low quality wrapping paper. Six of these mills produce about 23,000 tons, thus the remaining 13 mills have very small production volume of 1 to 2 tons per day.

In addition to the mills producing unbleached straw chemical pulp, there are a great number of mills which produce straw corrugating paper and straw board by use of a lime process. Total production of this grade of material amounts to about 80,000 metric tons per year, thus making a total production of unbleached straw pulp of all grades of about 105,000 tons per year. These mills use the pulp themselves and are all highly secretive about their operations, processes being used, etc. None of the French companies were known to have under construction facilities for producing bleached straw pulp on a large scale. However, the French delegation to OEEC has reported that capacity now being built amounts to about 50,000 tons of bleached pulp per year. No information could be found to substantiate these claims, and it appeared that large scale production of bleached straw pulp was at least a year or more in the future. Some mills which contemplate production of bleached straw pulp, but which have not yet constructed plants for this purpose, are as follows:

1. Cartonnerie la Rochette at Venizel
2. Cellulose du Pin at Facture
3. Avot Vallee at Blendecque
4. Societe des Papeteries Aubry, Croisset-les-Rouen
5. Papeterie de la Seine, near Paris
6. Papeterie Darblay

In talking with executives of these companies, it was learned that, in view of the softness of the pulp market, they hesitate to go ahead with plans for construction of large scale facilities for production of bleached straw pulp. They feel that it might prove to be more economical to purchase their pulp from Scandinavia if supplies remain adequate, prices continue to go down and currency exchange matters can be worked out. However, the opinion was expressed by one manufacturer, who has studied the use of straw extensively, that bleached straw pulp, in small quantities, would have its place in the industry, because of its special characteristics, regardless of the availability of wood pulp. Because of this fact, he expects to install equipment for production of small amounts of bleached straw pulp.

In the event that currency exchange difficulties cannot be worked out properly, then it will be necessary for France to go all out in efforts to produce large quantities of straw pulp for all grades of paper regardless of the economics involved. However, this condition is not anticipated.

The straw harvest in France amounts to about 20,000,000 metric tons per year; thus the pulp and paper industry has almost unlimited quantities of this material at its disposal. The collection problem does not seem to offer any serious difficulties, and the cost of the straw delivered to the mill amounts to only about $12.00 per metric ton. Thus, if it is felt that the situation is favorable from an economic standpoint, there seems to be plenty of room for expansion of the straw pulp industry, especially in the field of bleached straw pulp, which could be used as part of the fibrous furnish for many grades of paper now being produced entirely from softwood pulp.

French industry representatives feel that the establishment of a sizable bleached straw pulp industry in Western Europe would certainly have a stabilizing effect upon the prices of softwood pulp. It seems probable that in France some small straw pulp mills may be constructed with the idea in mind of operating them only when prices of wood pulp are high. The capital investment cost for a small monosulphite straw pulp mill is rather low and it would be excellent insurance to any company against excessive wood pulp prices.

Bleached esparto pulp is also produced in sizable quantities in France. Present production of this extremely high cost, high quality pulp is about 11,000 metric tons per year of which one company, Societe d'Alta produces 6,200 tons. It is used in high-grade book and Bible paper. Expansion of production of this type pulp will be moderate because of the high cost of production.

Some experimental work is now in progress on the use of Arundo Donax cane for paper pulp. During 1948, one mill produced about 300 tons of pulp from this material and mixed it successfully with other pulps

in various grades of paper. It is expected that production of pulp from cane will be increased substantially.

An estimated summary of production of pulp from straw and other agricultural wastes in France for 1948 is as follows:

Grade of Product	*Quantity Per Year In Metric Tons*
1. Unbleached straw pulp for paperboard and wrapping paper	25,000
2. Straw board for corrugated boxes	80,000
3. Bleached straw pulp	3,000
4. Bleached esparto pulp	11,000
5. Pulp from Arundo Donax cane	300
Total	119,300

B. The Huguenot Process for Production of Straw Pulp

A number of mills in France use the Huguenot Process for production of straw pulp for corrugated board and for rough quality wrapping paper. This process makes use of 5 per cent caustic soda on the basis of the dry straw in a continuous operation. The straw is fed continuously into the top of a tower where it is sprayed with the caustic solution. As the straw reaches the bottom of this tower, it enters a reaction chamber to which steam is added in order to heat the mixture to about 100 C. The reaction chamber is equipped with a slow moving agitator which keeps the high density straw in motion. This reaction chamber is a long horizontal cylinder and the straw gradually passes from one end of the chamber to the other end allowing a reaction time of about one half hour at this temperature. From the reaction chamber, the straw is dropped into a large deep chest through which it gradually moves and is discharged after an additional reaction time of approximately four hours. The straw is not heated during its passage through this chest. At the end of this time, the straw is completely cooked for use in high quality corrugating board or rough types of wrapping paper. This process is used by the following listed mills in France.

Papeterie Darblay
Cartonnerie Rayere
Cartonnerie de l'Hermitage
Cartonnerie Mecanique du Nord
Papeterie Malaucen

VII.—Developments in Austria

Straw is not used at all in the pulp and paper industry in Austria because there are no supplies of straw available from domestic sources.

VIII.—Developments in the United Kingdom

A. The Utilization of Esparto for Pulp and Paper

Esparto grass, which is imported from North Africa, has been a traditional raw material for production of high quality bleached pulp for high-grade papers in the United Kingdom. Previous to the war the esparto mills consumed about 350,000 tons

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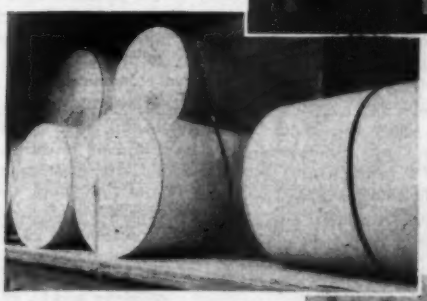

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of esparto grass for production of 150,000 metric tons of bleached pulp. Although the supply of esparto was cut off during the war, it has now been resumed and it is estimated that 150,000 metric tons of bleached esparto pulp will be produced during 1949.

Esparto grass is extremely expensive, being about $50-$60 per ton, and when it is considered that the yield of pulp is 42 per cent, the raw material cost per ton of bleached pulp is extremely high. It is justified on the grounds that extremely high quality papers can be produced from this pulp which bring a high price on both the domestic and export market.

All of the esparto mills use the conventional soda process in which they cook the grass in comparatively small stationary vertical digestors equipped with facilities for forced circulation of the cooking liquor. These mills have soda recovery plants, all of which are rather old.

B. The Utilization of Straw for Pulp and Paper

Before the war there was practically no straw used for the production of pulp and paper in the United Kingdom, and there was actually very little straw available for such use. However, when supplies of esparto grass were cut off from North Africa, it became necessary for the esparto pulp mills to seek another source of raw material. The cultivation of wheat had been increased greatly in the U. K. and considerable quantities of wheat straw became available. Thus the esparto mills turned to this material and gradually increased its use to 350,000 metric tons per year by the end of the war. About 120,000 tons of bleached straw pulp per year were produced from this straw.

Because of the great difference between esparto and straw, the esparto mills experienced many difficulties in converting from esparto to straw. All of these mills had soda pulping equipment with stationary vertical digesters specifically designed for esparto and this equipment was not suitable for economic production of straw pulp. At first they attempted to use the same process, with the same concentration of cooking chemicals and the same cooking time as had been used for esparto and as a result a very poor quality pulp was produced. By gradually modifying their process somewhat, they were eventually able to produce a suitable pulp. However, the pulp was never as good as could have been produced in equipment and by a process specifically designed for straw pulping.

Because of the difficulties involved and their traditional use of esparto, the use of straw was considered a temporary expedient. Thus, when esparto became available again after the war, almost all of the mills reverted to the use of this raw material with which they were completely familiar and for which their equipment had been designed. The use of straw decreased rapidy and at the time of the writer's visit only about 100,000 metric tons of straw per year was being consumed by the paper industry for production of about 35,000 tons of straw semipulp and bleached straw pulp.

There appeared to be a considerable amount of disagreement among industry executives and officials of the Paper Control Office regarding the potential use of straw for pulp and paper in the United Kingdom. The Paper Control Office and some of the industry executives claimed to have made an extensive study of the possibilities of the use of straw and concluded that it could not compete with imported wood pulp on a cost basis and thus would not be economically feasible on a large scale basis without government subsidy. On the other hand, executives of other companies in the industry, who had likewise made a thorough study of the problem, have concluded that on the long-range basis, straw pulp has a very definite place in the pulp and paper industry of the U. K. and that it can be produced economically.

Officials of the Paper Control Office claimed that they had given thorough consideration in 1939 to construction of a few large mills specifically designed for the production of straw pulp. However, because of shortages of steel, lumber, machinery and labor, these ideas had to be dropped. Almost all industry representatives agreed that if this project had been carried out under government subsidy, these mills would now be extremely beneficial to the economy of the United Kingdom. After the war, because of the high price of straw, the difficulties of collection, the problems involved in stream pollution, etc., the construction of new mills for production of straw pulp by the standard processes, such as the soda or Kraft processes, did not appear to them to be economical in the long-range program.

These officials did admit, however, that the continuous CELDECOR-Pomilio process described in detail in paragraph C of this report, or some of the other new processes might offer some possibilities for economic production although they mentioned the following obstacles even with these processes.

1. Even though the cost of producing pulp by these newer processes would be lower than by the conventional processes, it would still be difficult to compete in price with imported wood pulp. Thev feel that the price of straw pulp would have to be actually lower than that of wood pulp to insure its sale to the paper mills, and this would be impossible with the present high price of straw.

2. The price of straw is now rather high, being about $14.00 per metric ton and it would have to be as low as $6.00 or $8.00 per ton to make straw pulp production economical. The farmer is independent about selling his straw unless he gets a good price for it.

3. The moisture content of the straw varies greatly in the U. K. and much of the straw contains dirt and other extraneous material such as weeds, thistles, etc., and the problem of proper collection is a major one. Thus to go into straw pulp production on a large scale, there must be complete co-operation between the farmer and the pulp mill. This condition does not exist at the present time.

4. It is difficult to find locations in the U. K. where adequate straw supplies are available and at the same time facilities exist for adequate water supply, good transportation and means of getting rid of the waste liquors.

Although the above mentioned obstacles do present some problems, several of the leading companies in the United Kingdom have concluded that these problems can all be overcome in time and that the establishment of a straw pulp industry will prove to be of great economic benefit to the U. K. on a long-range basis. These companies feel that in view of the foreign currency shortage, combined with the fact that the U. K. has no domestic pulpwood supplies, all possible utilization should be made of domestic raw materials.

It is claimed by the farmers that as much as 1,000,000 metric tons of straw could be made available to the pulp and paper industry. At the present time much of this straw is burned or wasted. Due to the lack of experience in supplying straw to pulp mills, the quality of the straw is many times rather poor, with varying moisture content, and containing dirt and weeds. However, it is believed that cooperation between the farmers and the mills can be achieved so that the problem of collecting and baling straw properly can be solved.

At the present time there is approximately 100,000 metric tons of straw being used by the paper and board industry from which 35,000 metric tons of straw semipulp and bleached pulp are produced per year.

Most of the companies now utilizing straw are using some part of the CELDECOR-Pomilio process developed by the Cellulose Development Corporation. The activities, processes and equipment of this company are described in detail in the following section of this report. For many years they have specialized in the development of equipment and processes for the production of bleached pulp from straw and other agricultural residues. They have a complete small scale plant which is used as a pilot plant for continuous production of 3 metric tons of high quality bleached straw pulp per day. This plant has been used as a research installation for developing straw pulping processes on a practical scale. In addition, the company has had experience in 20 full scale plants in various parts of the world in which agricultural residues are being used. As a result of this background of experience, they are extremely enthusiastic about the possibilities of greatly increased use of straw in the future.

One mill visited, The Bowater's Lloyd Sittingbourne mill, was using the straw preparation equipemnt, the caustic reaction tower, and the screening and washing equipment of "CELDECOR" for continuous production of about 30 metric tons of unbleached straw semipulp per day. This was being used, along with waste paper, for production of high quality corrugated paper. Another mill has been using their rotary globe digesters for the caustic cook in the usual batch operation and the "CELDECOR" continuous chlorine reaction tower for the second stage reaction for production of both bleached straw and esparto pulp.

The Thames Board Mill uses continuous digestion equipment of their own design for production of about 20 metric tons of rough straw semipulp for use in board. In this process they treat the straw with 6 to 7 per cent caustic and run the threaded straw through stationary tubes by means of a screw conveyor, adding steam along the tubes. The tubes are 30 feet long and 2 feet in diameter and the straw is run through two

or three of these tubes depending upon the extent of cooking desired.

Because of their faith in the future of straw pulp in the U. K. based on a thorough investigation of the possibilities, the Bowater's Lloyd Company has under construction a complete "CELDECOR" plant for production of 24 metric tons of bleached straw pulp per day. If this plant is successful, and they expect it to be, they plan to invest heavily in the development of the utilization of this domestic raw material. Even though the operation may not be economical in the initial stages, they feel that it will become of great importance to them on a long-range basis.

C. The Cellulose Development Corporation, and the CELDECOR-POMILIO Process for Production of Pulp from Agricultural Residues

The Cellulose Development Corporation with headquarters at 9, Anselyn Road, Hatch End, Middlesex, has specialized for many years in the development of equipment and processes for the production of bleached pulp from straw and other agricultural residues. They have at St. Paul's Cray, Kent, a complete small scale pulp mill which is used as a pilot plant for continuous production of 3 metric tons of high quality bleached straw pulp per day. This plant has been used as a research installation for developing straw pulping processes on a practical scale, and the pulp produced is used in fine papers by an adjoining paper mill.

The bleached straw pulp pilot plant and the mill using the pulp were both visited. In addition extensive discussions were held with Mr. F. G. L. Becker, Managing Director of the Cellulose Development Corporation, Mr. C. B. Tabb, his assistant, and with Mr. William Nash, Manager of the mill which uses the bleached straw pulp produced. Complete information was obtained on the process and equipment and on the many projects in which this company is involved in various countries all over the world.

The company has obtained the world patent rights to the Pomilio continuous process for producing bleached pulp from agricultural wastes. This basic process is described in detail in Section II-D of this report. The process and the design of the equipment used has been improved greatly by "CELDECOR" as a result of their thorough study and experience. In addition they have obtained the patent rights to equipment for preparation and cleaning straw. This equipemnt was formerly manufactured by The Max Grumbach Company in Freiburg, Germany, and most of the straw pulp mills built in Europe before the war obtained their straw preparation equipment from this source. The design of this equipment has also been vastly improved by "CELDECOR" so that former operational difficulties have been eliminated.

"CELDECOR" claims to be able to give paper companies a comprehensive service, acting in the capacity of consulting engineers in many parts of the world. They supply the specialized types of equipment necessary for the production of pulp from straws, and other agricultural residues, recommend processes suitable for the particular raw material, design and assist in construction

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of complete pulp mills for the processes recommended. It is believed that their staff has had more practical experience in this field than any other company in the world. Although they favor the "CELDECOR"-Pomilio process in locations where it is practicable, they do not limit themselves to this process but can lay out plants for other processes where the particular conditions are more suitable for such processes.

The Company has had experience in 20 full scale plants in various parts of the world in which agricultural residues are being used. The latest project completed was a new mill in Algiers—cie Nord-Africaine de Cellulose which is now in operation producing bleached pulp from esparto and straw in a completely continuous process. Other mills retained by "CELD-ECOR" are located in Italy, France, South Africa, Argentina, Chile, Uruguay, India, England and the Philippines. Complete equipment for production of bleached straw pulp is now being constructed for three French mills and for one mill in England.

In addition to the mills which use the complete CELDECOR-Pomilio process some mills use only parts of the equipemnt. One mill visited was using the caustic reaction tower for continuous production of about 35 tons of unbleached straw pulp per day. This is used, along with waste paper, for production of high quality corrugating paper. Another mill in England uses the regular globe rotary digesters for the caustic cook in a batch operation and the "CELD-ECOR" chlorine reaction tower for the second stage for production of both bleached straw and esparto pulp.

In view of the high state of development and the success of practical applications of this process, it is believed that its use will be extended greatly in the future in locations where inexpensive sources of straw, salt and power exist.

Some details of the CELDECOR-Pomilio process are as follows:

The baled straw is delivered to a straw cutter continuously by means of a conveyor. The cut straw is then run through dusting and cleaning equipment, which removes the extraneous dirt, and much of the undesirable fines and nodes of the straw plant. This clean straw is then fed continuously to a dosing and mixing machine. The caustic cooking liquor is also fed into this machine continuously and mixed thoroughly with the straw. Approximately 8 per cent caustic based on the dry weight of the straw is added at this point, and the liquor is taken up by the straw so that there is practically no excess liquor leaving the dosing chamber with the straw. From the dosing and mixing machine the wet straw is conveyed to the top of the caustic reatcion tower by means of a screw conveyor. This tower is circular in shape and is about 60 feet high. The treated straw passes slowly down through the tower by means of gravity, and low pressure steam is added along the walls of the tower. It is possible to reach temperatures of as high as 130 C in the lower part of the tower without having steam escape from the top. The bottom of this tower is increased in diameter so as to allow longer digestion time without an excessively high tower. The cooked straw is removed from the bottom of the tower at a constant rate which can be regulated by the operator, in accordance with the digestion time desired. Normally the total digestion time is about 1½ hours.

The digested straw is conveyed from the bottom of the tower to vacuum filters on which it is washed free of cooking liquor. From these filters the clean semipulp goes to screw presses which dewater it down to about 25 per cent bone-dry content. It is then run through an opening machine which fluffs the semipulp so as to expose a large surface area for the subsequent chlorination. It is then conveyed to the top of a chlorination tower which is constructed somewhat similar to the caustic reaction tower. As the semipulp passes down through this tower by gravity it comes in contact with chlorine gas which enters the tower through pipes around the wall. Because the surface area of the pulp is large due to its opened condition, the chlorine gas is taken up immediately and none escapes through the top of the tower. Consumption of chlorine in this stage amounts to about 18 per cent based on the dry weight of the finished bleached pulp.

The chlorinated pulp is continuously removed from the bottom of the tower and goes into a pulp chest where it is diluted and then run over a vacuum washer and thickener. The pulp is then subjected to an alkaline extraction process using 4 per cent caustic based on the dry weight of the finished bleached pulp. This extraction is carried out at high density in a continuous manner. After leaving the caustic extraction tower, the pulp is washed again on a vacuum filter and run over coarse shaking type screens to remove large particles such as nodes from the straw, etc. It is then run through rifflers, at very low consistency where additional nodes, heavy dirt, etc., settle out and finally run through fine screens and vortraps to remove the finer dirt. Following the cleaning operation the pulp is thickened and run through a continuous hypochloritic bleaching operation in which about 3 per cent available chlorine is used based on the dry weight of the bleached pulp. The bleached pulp is finally washed and either made into sheets or sent in slush form to a paper mill.

By this process an excellent and clean bleached straw pulp can be produced.

D. Production of Wallboard

Total production of wallboard, including both insulating and hardboard amounts to 30,000 metric tons per year. About 8,000 tons of this wallboard is produced from waste wood and tree trimmings from domestic sources. The remainder is produced by The Celotex Corp. from imported sugar cane bagasse and domestic waste paper. No appreciable use has been made of straw for production of wallboard in the United Kingdom, although there appears to be good possibilities for its future use. Successful mills are in operation in both the Netherlands and Ireland for production of wallboard from straw. As mentioned previously, this raw material is available in large quantities in the U. K.

Convention Papers . . . Abridged

Groundwood Bleaching at Blandin*

C. A. RICHARDSON
Blandin Paper Co.

This paper is a description of the groundwood bleaching process being used at the Blandin Paper Co.

Bleaching is carried out at medium density. The density in the bleaching tower is between 13 and 16 per cent. Unbleached groundwood is pumped from pulp mill storage tanks at about 3.0 per cent consistency to a DeZurik regulator. The stock level at the regulator is held constant by an air-operated butterfly valve in the pipe line. The consistency is reduced to 2.5 per cent at the regulator; and the stock is fed to a stock meter of the paddle-wheel type. The stock meter is driven by a variable-speed motor. Its speed is recorded directly on a chart as air-dry tons per hour.

The stock now falls into the headbox of an 8 ft. x 14 ft. Impco thickener clothed with a 17 x 24 in. stainless steel wire. The thickener has a variable speed drive. The speed of the drive is regulated by the operator to suit stock conditions. The thickener is equipped with a press roll to aid in maximum water removal. The sheet comes off at from 15 to 18 per cent density, depending upon the temperature and other operating variables. Removed from the wire by a stainless steel take-off roll, revolving at about 400 rpm, it falls into a shredder which breaks the sheet up.

A screw takes the pulp from the shredder to a single-shaft mixer. Here it can be heated by steam if desired. From this mixer, the pulp falls into the double-shaft mixer, where it meets the bleach liquor and is thoroughly mixed with it. From this latter mixer, the stock falls into a retention tower where it is allowed to bleach about two and one half hours.

The thick stock is removed continuously from the bottom of the retention tower by discharge sewers. As it leaves the tower, it is diluted with clarified white water from the paper machine save-alls. It then enters another single-shaft mixer. Here it is mixed with a solution of sulphur dioxide and water for neutralization of the residual peroxide and alkali.

Falling from the mixer into a small constant level chest, the stock is removed from the chest continuously through a DeZurik regulator; and is delivered to a storage chest ready for the beater room at 3.50 per cent.

White water from the thickener is used for dilution of the raw stock at the regulator, for diluting showers in the thickener vat, and for the wire-cleaning shower on the thickener. The excess is pumped to the pulp mill or goes directly to the sewer.

Bleach Liquor

Bleach liquor is prepared in a well-agitated tank of approximately 5,400 gallons capacity. Some water is run in, and a solution of epsom salts is added. Then sodium silicate is added, followed by sodium peroxide. After this is dissolved, hydrogen peroxide is added and the tank filled with water and allowed to mix thoroughly. Then a sample is taken and tested for peroxide content and alkalinity, as a check on the liquor making process.

The liquor is pumped as needed to a smaller tank from which it is fed into the thickened stock by a piston-type proportioning pump. The liquor from this feed tank is tested every two hours, and the liquor feed per ton of pulp is regulated by the result of these tests. In this way, any variations in the liquor, due to either preparation or stability, are taken into account; and a constant amount of oxygen is supplied to the pulp as peroxide.

Sulphur Dioxide

Sulphur dioxide is used to reduce the residual peroxide and to neutralize the residual alkali in the stock at the end of the bleach. The sulphur dioxide, purchased as a liquid in one-ton tanks, is mixed continuously with water by means of an Ansul Chemical Co. mixing valve.

Flow of sulphur dioxide is controlled by means of an automatic *p*H controller. The electrodes of the controller are located in the stock chest immediately after the single shaft mixer.

The *p*H of the stock is maintained just below the neutral point. This procedure is followed to prevent an excess of sulphur dioxide entering the paper mill and causing corrosion.

Instrumentation

Practically the whole process, except liquor preparation, is controlled from a central panel located near the thickener.

This panel contains starting switches for all the machinery; indicating instruments for raw and bleached stock chests; recording instruments for tower level, liquor tank level, and stock meter speed; and recording and controlling meters for the regulator level, stock temperature, and *p*H.

The panel also contains rheostats for regulating the speed of the stock meter, thickener, and discharge screws; tell-tale lights for both DeZurik regulators; control for the air loading of the press roll; and miscellaneous pressure gauges, etc.

Motor starting switches are tied together so that if a piece of machinery kicks out, other pieces feeding it or dependent on it also are stopped. This arrangement prevents spill-overs or other troubles in the absence of the operator.

The bleach plant was designed for 60 tons air-dry per day. Shortly after it was started, however, it became necessary to bleach considerably more tonnage. By making a few minor changes, such as speeding up the stock meter and the discharge screws, it has been possible to bleach over 90 tons regularly, with a maximum of 115 tons.

One operator per shift takes care of the bleach plant. His duties include, besides the operation of plant, the testing every two hours of the consistency of the raw stock, thickened stock, and the bleached stock after dilution; the testing every two hours of the bleach liquor; and the preparation of the bleach liquor.

Variables in the Process

There are many variables in the bleaching process, but fortunately there is a great deal of flexibility.

The alkalinity of the bleach liquor depends on the ratio of sodium to hydrogen peroxide, in case a mixture is used; or on the amount of sulphuric acid, where sodium peroxide and acid are used. Alkalinities obtained by neutralizing from about 30 per cent to about 80 per cent of the sodium peroxide with acid (or the equivalent mixtures of hydrogen peroxide and sodium peroxide) produce the same bleaching results as judged by brightness, freeness, and strength. However, the higher the alkalinity, the more rapid the bleaching action.

The sodium silicate apparently acts as a stabilizing agent for the peroxides both in the liquor before use and during the bleaching process. A solution of sodium peroxide in water is not stable without silicate. In bleaching, a minimum amount of silicate is necessary for maximum brightness and minimum decrease in strength. This minimum apparently varies with the alkalinity, being higher at higher alkalinities. Thus at 2.0 per cent peroxide, at least 4.5 per cent of silicate on the bone-dry pulp basis is necessary.

The effect of density within the range of 11 to 16 per cent is merely the expected action in speeding up the reaction. The effect of temperature between 85 F. and 115 F. at least is also only on the reaction rate.

Thus it can be seen that by varying the alkalinity of the liquor, the stock temperature, and the density, the bleaching capacity of the tower can be increased greatly. At

(*) Abridged from paper given before the fall meeting of the Northwestern Division of the American Pulp and Paper Mill Superintendents Association, held at the Hotel Duluth, Duluth, Minn., Oct. 4-5, 1949.

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about 16 per cent density and 110 F. with a fairly alkaline liquor, maximum brightness can be reached in one hour.

On the other hand, normally, the tower is left full over a one-day shutdown on week-ends, and the pulp used after the usual neutralization on Monday morning with no significant loss of brightness. In fact, one time last year, when the dam at the mill was lost, some stock sat in the tower for three weeks and still retained over half the brightness increase due to bleaching.

Results

The cost of chemicals for bleaching and neutralizing varies from about $6.50 per air dry ton at 1.5 per cent peroxide on the weight of bone-dry pulp to about $8.50 at 2.0 per cent.

The final brightness of the bleached pulp obtained in commercial operation depends on many factors, including the species of wood, the brightness of the unbleached pulp, the amount of peroxide used, the color of the river water, and the brightness or color of the water used for dilution after bleaching. It has been found that aspen bleaches best; balsam, next; spruce, slightly less; and jack pine, practically not at all.

The brightness standards set for our papers require a bleached groundwood brightness of about 69.5. The amount of peroxide required to obtain this figure varies with the wood, both as to species and brightness. With about 15 per cent aspen and an unbleached brightness of 61, about 1.6 per cent peroxide is required. With no aspen and a starting brightness of 60, about 2.0 per cent is required.

Chips from Veneer Waste*

JAMES C. HAYES
Woodlands Manager
Everett Pulp & Paper Co.

Reject sheets of veneer wood were 8 feet long, lengthwise of the grain. They varied from one tenth to one seventh of an inch in thickness. They usually were from 3 to 4 inches up to 18 inches or 2 feet in width, the width depending on how the clipperman trimmed out the defects.

It was very evident that these sheets, too light to be handled in a conventional chipper, would have to be sheared off rather than chopped. The problem was taken to the Sumner Iron Works. Here, after considerable study, a veneer chipper was evolved. A production of 5 to 10 units of chips (200 cubic feet per unit) per day was expected of it. The output, however, jumped almost immediately to 20 such units a day.

The present veneer chipper is almost identical in design with that of the original unit. Its base, drive, and disc resemble very closely the comparable parts of a conventional chipper. The difference lies in the way the knives are set in the disc

In the conventional pulpwood chipper, the knives are bolted onto the side of the disc; the straight edge of each knife is the trailing edge.

In the veneer chipper, the knives are set so that each blade extends through a slot in the disc and so that the straight edge of each knife is the leading edge. A very close clearance is maintained between the edge of each knife and the bedplate or anvil upon which the sheets of veneer rest as they are fed into the machine. This assembly gives the same action as a pair of shears.

The throat of the veneer chipper is set at an angle of about 30 deg. The veneer sheet rejects are fed to it through a pair of power-driven feed rolls which are fluted to insure positive feed. Set as close to the disc as possible, these rolls prevent the sheets from being upended or dragged through the chipper without being cut. The length of chip is determined by the speed of the rolls, and the distance that the knife blades protrude through the slots in the disc.

The speed of the rolls is synchronized with the speed of the disc.

The first veneer chippers individually had a 54-inch disc and were of the 4 knife type. More recent designs individually have a 66-inch disc which is equipped with 6 knives.

The optimum speed of a veneer chipper is approximately 700 rpm.

The 66-inch chipper has a theoretical capacity of approximately 8 units an hour. In several instances, this machine regularly is turning out 40 units in 8 hours. There are cases where even this production is being exceeded.

Chips produced from veneer rejects are quite satisfactory. They are clean and uniform. Their only possible contamination is bark; and since all veneer blocks are barked before being put in a lathe, bark gives very little trouble.

(*) Abridged from an address given before the Pacific Coast Division of The American Pulp and Paper Mill Superintendents, held at Seattle, Wash., Dec. 3-4, 1948.

The bulk of the rejected sheets comes from the sapwood, the youngest portion of the tree, which yields the best fibers.

These chips, when compared to other chips, show no appreciable difference in cooking requirements. Since they are uniformly thinner than the ordinary chips, it is possible that there is some side penetration of the cooking liquor.

It is conservative to estimate that the 12 or 14 chippers now in constant use on the Pacific Coast are averaging something better than 20 units a day apiece. Probably, 50 to 60 thousand units of chips are being produced yearly from this veneer waste. This production represents the equivalent of some 25 million board feet of logs a year. Yet there is still a considerable quantity of rejects that is not being reclaimed.

The veneer chipper is primarily adapted to the chipping of lightweight, thin material, such as veneer sheets or green boards of an inch or less in thickness. It is not adapted to heavier cuts.

Chipper Drives*

H. P. BARROW
General Electric Co.

The considerations for a chipper drive are first, load requirements, and, second, the type of motor. Possibly the word *cost* overshadows the entire project, but let us hope not to the extent that the chipper and drive cannot be chosen to do the work required without keeping the production and maintenance departments in distress.

The first consideration can be approached knowing the volume of a certain length chip and of a particular kind of wood. We have arrived at a maximum hp. for a cu. ft./sec. for various woods. For example, Douglas Fir, 296 hp./cu. ft./sec.; Black Gum, 362; Yellow Pine, 344; and Red Oak, 486. The cu. ft./sec. can be derived by the following formula:

$$\frac{\text{Sq. In. Area of Log} \times \text{In. Chip Length}}{1728} \times \text{No. of Knives} \times \frac{\text{R P M of Chipper}}{60}$$

The product of cu. ft./sec. x hp./cu. ft. for the particular kind of wood gives the maximum hp. requirement.

The spout size determines the largest diameter logs and thus the peak load possible. The drive must be able to operate under this peak load for at least a short time. It is well to remember the heating of a motor is proportional to the sq. of its load or current. Therefore, if a motor is to operate at the maximum requirement continuously, the hp. rating must be equal to the maximum requirement.

If the normal running load requirement is less than the maximum, the motor rating may be proportionately less. By using a motor with 250 to 300 per cent normal torque available before pull out or break down, the peak condition can be met for a short time, possibly a matter of seconds, for a 200 to 250 per cent load; minutes for 125 to 150 per cent load; maybe hours for a 100 to 125 per cent load.

Of course, a lot depends on the condition of the motor when the overload occurs. For instance, if the motor is already up to normal temperature, carrying full load, and is then subjected to heavy overload, it will have an excessive temperature rise, especially if the surrounding air temperature is high or if the ventilation is restricted by foreign materials in the air ducts. The expected life of insulating materials on windings decreases rapidly with temperatures above 100 C.

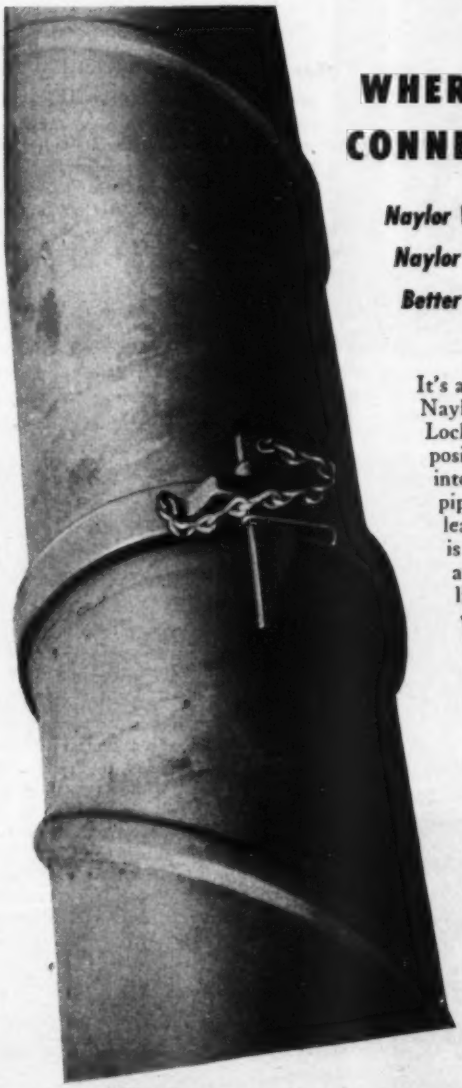
It may be comparatively simple to predict the maximum load requirements but not so with the necessary requirements of the many variables that may take place. Such variables are: diameter of logs; chip length; condition of knives; amount of wood for feeding the chipper. The selection may be made from a combination of calculations and experience.

The selected type driving motor may be a synchronous, squirrel-cage, or wound rotor induction motor.

The synchronous motor gives constant speed chipping. It is the least expensive per hp. at the lower speeds and for that reason is usually direct connected. It has the best power factor. The starting torque is usually 50 per cent of normal; its pull-in torque, 60 per cent; its pull-out torque, 250 per cent;

(Turn to page 1364)

(*) Abridged from an address given before the Southern Division of the American Pulp and Paper Mill Superintendents, held at Monroe, La., Oct. 24-26, 1949.



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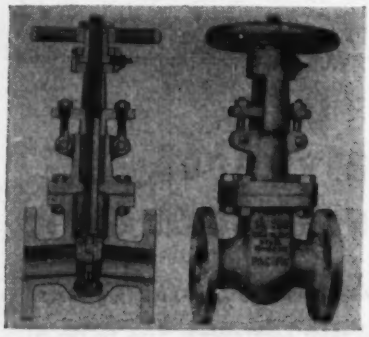


The 150 lb. Series stainless steel, O.S. & Y. bolted bonnet, gate valve with flanged or screwed ends is available in sizes ranging from ½ in. to 6 in. with flanged ends machined to M.S.S. or A.S.A. specifications, and in sizes ½ in. to 2 in. with screwed ends. Trim material regularly furnished conforms to A.I.S.I. specification Type 316 stainless steel. All other important parts are of Type 303 stainless steel with the exception of the nickel-alloy yoke sleeve. Also available is a new 600 lb. Series carbon steel gate valve in sizes from ½ in. to 2 in. with flanged (A.S.A.) screwed, or socket welded ends. These valves can be furnished of the same material as the 150 lb. valve. Pacific Valves, Inc., 3201 Walnut Ave., Long Beach 7, Calif.

Twine Dispenser

Adaptable for use in a wide variety of packaging fields.

New twine-ribbon dispenser effects savings in tie-up time and effort, reduces material waste and guards fingers from painful cuts and string burn. Unit is adjustable to all the most commonly used twine and ribbon spools. Equipped with four nonslip suction cup legs for anchoring to counter or wrapping table. Frame is of heavy-gauge steel, with black, nonglare crackle finish. Feeder arm, of same material and finish, is durably spot-riveted to frame. A crab-claw cutter guard prevents finger contact with razor cutting edge. Cowan Manufacturing Co., 24 California St., San Francisco 11, Calif.

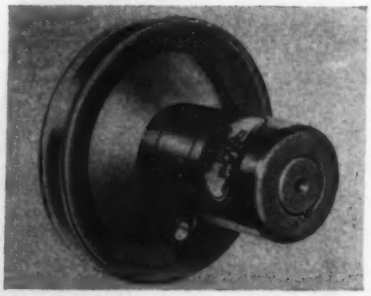
Buffer Solutions

For calibrating any pH instrument.

Solutions are supplied in 1 pt. unbreakable, noncontaminating, reusable polyethylene bottles on which are printed *pH* temperature calibrations from 0 to 60 C. Buffers are made, and checked after bottling, to National Bureau of Standards specifications. Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44, Pa.

Speed Control

For small and light machinery.



This redesigned speed control unit is offered as a means of providing accurate and dependable variable speed control for machinery such as grinders, buffers, saws, blowers, ovens, etc., without stopping the machine. It comprises a self-adjusting V-type pulley which may be mounted on the shaft of the constant speed motor, and connected with V-belt to driven machine. There are four main parts; a stationary cone-faced disc, sliding cone-faced disc, tension spring and spring cover. Reeves Pulley Co., Columbus, Ind.

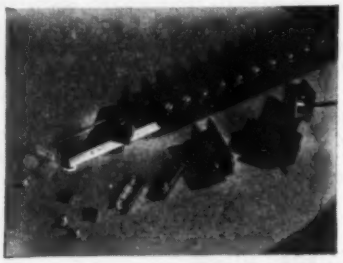
Magnetic Adhesive

Makes possible the pre-cementing of many materials.

Known as H-511 Ubabond, this synthetic rubber cement offers possibilities for increasing the efficiency and lowering costs of current cementing operations. Pre-cemented surfaces can be joined together at a later time, on an assembly line or even after shipping to point of use, without loss of adhesion efficiency. Union Bay State Chemical Co., 50 Harvard St., Cambridge, Mass.

Terminal Blocks

Can be assembled into strips of any length from 1 to 75 pairs.



Sectional terminal blocks of the single-circuit type are made of molded Melamine for high dielectric strength. Units are twisted into a keystone-type mounting channel. Intermediate units can be removed without disconnecting other units. Available in 25 and 50-ampere sizes, suitable for any voltage up to 600-V, a-c or d-c. Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa.

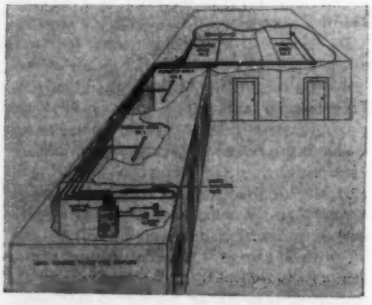
Filter

Permits use of either scraper or string discharge.

The new pilot plant FEinc filter is capable of handling any continuous filtering operation in small production, and experimental or temporary processes. This unit can be used for complete chemical washing, for compression drying only, or can be disconnected entirely. The string discharge mechanism handles difficult cakes cleanly, efficiently and with longer cloth life. Filtration Engineers Inc., 155 Oraton St., Newark 4, N. J.

Smoke Detector

Protects four spaces simultaneously.



Two main units comprise the multi-space detector—control cabinet and analyzer tube. In each protected area or zone, one or more accumulators are installed at the ceiling.

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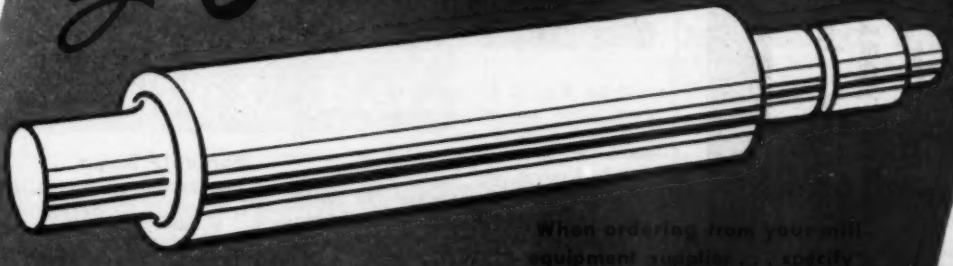

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Weather proof, the CSP Life-Line motors can be furnished as a complete motor, a motor without base, or as a stator and rotor. Typical uses include paper mills, irrigation work, construction projects, and similar applications where an efficient constant speed motor is required. Motors are of the squirrel cage induction type, providing smooth operating characteristics, low maintenance and ease of installation. Westinghouse Electric Corp., Box 868, Pittsburgh 30, Pa.

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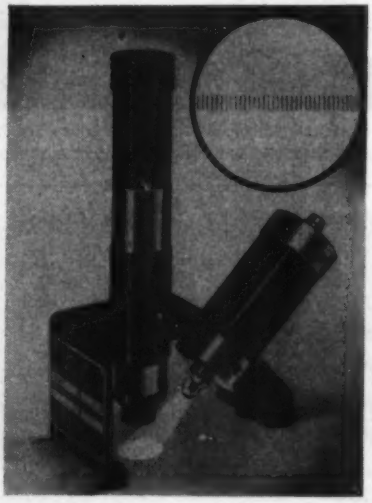

Model No. 232 is a microscope with self-light source and reticle, designed for all types of industrial work, for use in the laboratory, shop, or for production. It has resolving power and light efficiency. No external illumination is needed. For quantitative measurement and analysis of all types, a reticle has been incorporated for direct measurements with divisions of .004 in. and .002 in. for respective powers. Microscope has a magnification or either 20X or 40X. Clarkstan Corp., 11927 W. Pico Blvd., Los Angeles 34, Calif.

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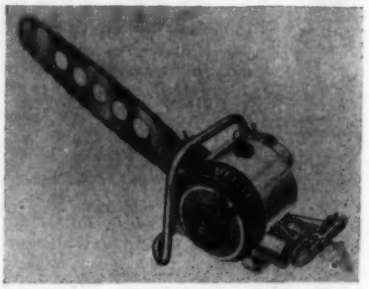
Chain Saw

Weighs only 33 pounds.



Easiest handling, fastest cutting, lightest weight and lowest maintenance cost are the features claimed for this new one-man gasoline engine driven chain saw. Minimum weight is achieved by using die cast magnesium and aluminum alloys for all major castings in both the engine and saw. Fast cutting speed of the Homelite chrome-plated chain is due to a narrower kerf and simple design which causes less drag and removes less wood. It is claimed to cut many times longer before requiring sharpening, and much longer between sharpenings. Homelite Corp., Port Chester, N. Y.

Clutches

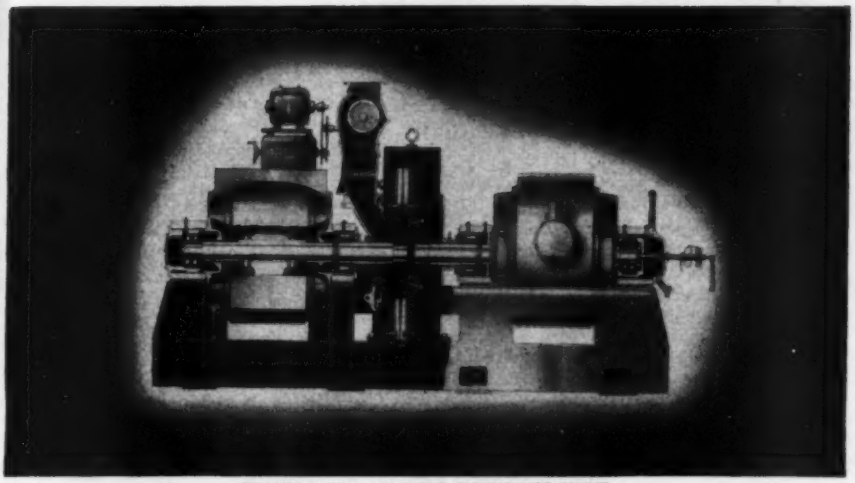
Available with a choice of demountable pulleys.

Known as the Series G line, the new clutches are developed for distribution in the gasoline engine replacement, maintenance, and service markets. They are designed for gasoline engines with a rating of from ¾ hp. to 15 hp. and for use with all the well known makes of gasoline engines. Units are automatic, compact, and self-contained. Other features include automatic loadless idling, smooth pick-up of load, elimination of engine stalling, and protection of the engine from excessive overload. Mercury Clutch Div., Automatic Steel Products, Inc., Canton, Ohio.

Portable Ramp

Provides a gradual incline for rapid loading.

This portable ramp, with adjustable height features, offers a solution to a num-



SECTIONAL VIEW OF BAUER DOUBLE-DISC PULPER

Bauer PULPER

PRODUCES LONG FIBERS

The Bauer machine makes a desirable pulp for liner because it brushes and works upon the diameter of the fiber rather its length.

This quotation is from an article describing the equipment in a pulp and board mill. It emphasizes a characteristic of the Bauer Pulper; viz., the production of long fibers.

Bauer Pulpers are used for processing raw, steamed, and cooked chips from soft and hard woods; groundwood rejects; sulphite and soda pulps; kraft knotter and screen rejects; waste paper of all kinds; bagasse, licorice root, and bamboo fibers; straw and many other agricultural residues.

Ask for complete information. If you have special pulping and refining problems, you are invited to utilize our laboratory facilities.

The BAUER BROS. CO., Springfield, Ohio

The Trade-Mark of

Dependable Felts

TRADE MARK

The Waterbury Felt Company

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SULPHITE MILL ACID PLANTS

SULPHUR BURNING PLANTS
JENSSEN TWO TOWER ACID SYSTEMS
GAS COOLERS—SURFACE AND SPRAY TYPE
JENSSEN PRESSURE ACID SYSTEMS
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FOR BLEACH PLANT APPLICATION
SULPHUROUS ACID PREPARATION

G. D. JENSSEN CO. INC.
WATERTOWN, NEW YORK
WESTERN REPRESENTATIVE:
A. H. LUNDBERG, 308 Orpheum Building, Seattle, Washington
FOUNDED 1915

This is an **OWEN PULPWOOD GRAPPLE**

To handle a *greater volume* of pulpwood in *less time* and at a *reduced cost,* some of the world's largest Pulp and Paper Mills have installed the Owen Grapple System.

Wouldn't it be wise to think in terms of your pulpwood handling problems today, in order that you may operate the more profitable "Owen Way" tomorrow?

Write for illustrated bulletin.

The **OWEN BUCKET** *Co.*
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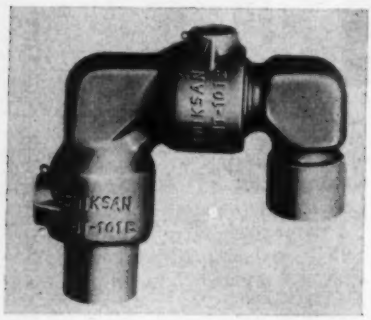
BRANCHES: New York, Philadelphia, Chicago, Berkeley, Calif.

ber of troublesome problems and hazards which cause excessive loading and unloading time, injuries to men, and damage to goods. A mechanical screw-type lifting gear provides a 12 inch variation in height at one end of the ramp. Wheels of the ramp may be retracted by cranking to clear the ground, allowing the ramp to move vertically with the truck bed if springs and tires deflect under heavy loading, keeping ramp and truck bed aligned. Barrett-Cravens Co., 4609 S. Western Blvd., Chicago 9, Ill.

Swivel Type Joints

High temperature with metallic seal.



Built to operate at temperatures to 600 F. and maximum working pressure of 300 psi, these high temperature swivel joints are made in 8 different styles for full 360 deg. turning in 1, 2, and 3 planes. The metallic seal is fully effective in both constant and intermittent service. Available in ¾ in., 1 in., 1¼ in., 1½ in. and 2 in. sizes with either threaded or flanged ends. Chiksan Co., Brea, Calif.

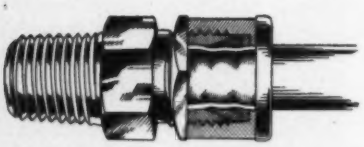
Battery Charger

Fills every requirement for ideal battery charging.

Known as the KX Charg-O-Matic for electric industrial trucks, this model is a fully automatic motor-generator type, single circuit battery charger requiring no base, bench or stand. It is a compact, packaged unit designed for easy installation and easy operation. This unit will charge one lead-acid battery in eight hr. or less and one nickel-alkaline battery in seven hr. or less. The Hertner Electric Co., Elmwood and Thomas Aves., Cleveland, Ohio.

Tube Fittings

Provide triple seal and axial support.



These "clinch-type" fittings, known as Swagelok, are for use with any type of metal or plastic tubing and provide leak-proof seals at three points. Two ferrules and a threaded chuck clamp around a tube and permit unimpeded flow of liquids or gases. Design of the fittings require no disassembly before use. Crawford Fitting Co., Cleveland 17, Ohio.

Shaft Seal

A mechanical means for prevention of leaks around a rotating shaft.

When a positive shaft seal is required for installation on equipment, moving or transferring liquids, as well as for replacement of conventional stuffing boxes where packing has proven unsatisfactory, this new mechanical shaft seal should be tried. Three general classifications are available—standard, abrasive-resistant, and special. The standard shaft seal is suited for use when a limited amount of abrasive material is present in the liquid being pumped or transferred; abrasive-resistant seal can be applied to all abrasive liquid conditions; and the special is constructed of special materials to meet unusual liquid or fluid conditions. Complete mechanical shaft seal is of the cartridge type, and unit construction makes for easy replacement and maintenance. Maximum pressure recommended is 400 psi. Peerless Pump Div., Food Machinery and Chemical Corp., 301 W. Avenue 26, Los Angeles 31, Calif.

Electric Sharpener

Will not burn knife blades or grind them away.

Employing magnetic honing action, the sharpener is claimed to produce butcher-sharp edges easily, quickly and safely on all kinds of knives, chisels, hatchets, tool bits, scrapers, etc. The new device has no wheels, no belts, no gears and requires no oiling. Syncro Corp., Dept. 1553, Rochester, Mich.

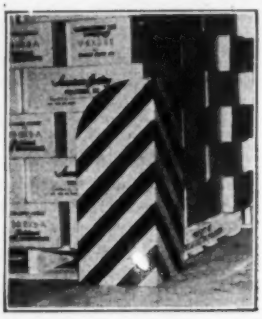
Portable Ventilators

Can be wheeled from place to place on the job.

These portable ventilators are ideal for cooling and ventilating tunnels, engine rooms, storage tanks, ship holds, etc. Equipped with high-velocity fans powered either by gasoline or electricity, the units provide both ventilating and cooling air thus making work in high-temperature and noxious atmospheres safer and more comfortable. Air is conveyed to the desired point through a 14 inch dia., 16 ft. long canvas duct. Ducts are treated for flame and mildew resistance, and when not in use can be collapsed and folded into a compact bundle. Two-way air flow feature permits the duct to be connected to either inlet or discharge side of the fan, allowing both dust or noxious gases to be drawn from the area. Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.

Corner Protector

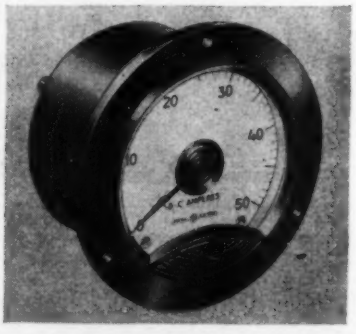
Weighs only 35 lb. and is easily portable.



Made of heavy gauge steel, the corner is held rigid by the square metal base which slides under pallet, skid or box. Baked enamel finish is striped orange for greater visibility. Placed at aisle corner, this protector quickly pays for itself by preventing damage to materials and prompts better housekeeping. Height, 30 in., width, 12 in. Economy Equipment Co., 5005 Euclid Ave., Cleveland 3, Ohio.

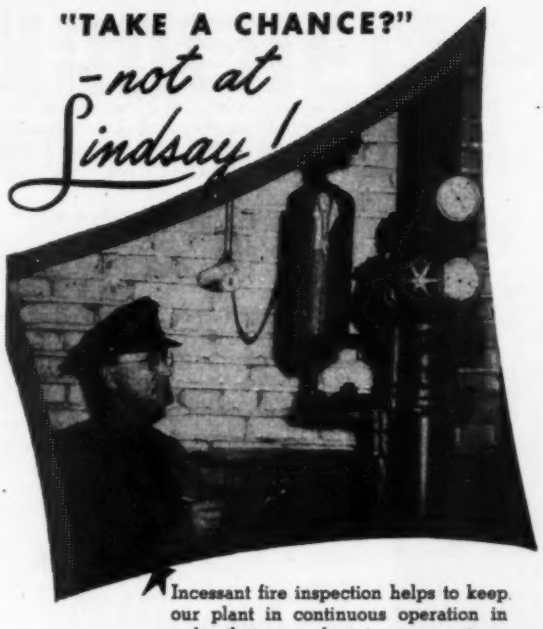
Small Instruments

Have permanent-magnet, moving coil mechanisms.



Designated as Types DO-81 (direct current), DO-82 (thermocouple), and DO-83 (rectifier), the new instruments employ standard 3½ in. round and square cases with 250-deg. scales 4.92 in. long for good readability. The instruments were designed for general industrial applications, as well as for manufacture of electronic devices, testing equipment and similar apparatus. Housed in molded Textolite cases which are dustproof and moisture resisting, the instruments are made for flush mounting on non-magnetic or steel panels. General Electric Co., Schenectady 5, N. Y.

"TAKE A CHANCE?"
-not at Lindsay!



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MATRIX SHEARS
STRAWBOARD

SINCE 1830
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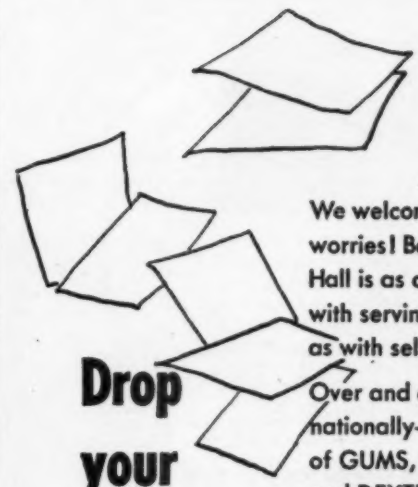
MICRO GROUND



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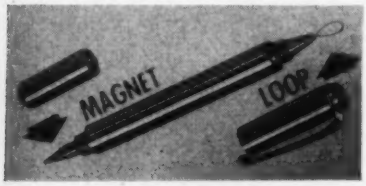
Eye Magnet

Designed to remove foreign matter from the eye.

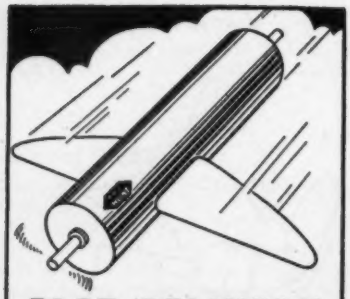


Deluxe eye magnet is made of stainless steel with one end a powerful magnet which picks up iron or steel particles imbedded on the surface of the eye. Other end is a wire loop for non-magnetic particles. Each end is protected by a screw-on cap. Instrument may be sterilized without affecting the magnet. General Scientific Equipment Co., 2700 W. Huntingdon St., Philadelphia 32, Pa.

Tachometer and Cutmeter

Eliminate inherent disadvantages and inaccuracies of mechanical types.

The new portable M1200-F electric tachometer and cutmeter assures accuracy of better than ±½ of 1 per cent of full scale value in measuring either surface speeds in fpm or shaft speeds in rpm. This same accuracy is maintained at both low and high speeds over the entire range of from 0 to 5,000 fpm or 0 to 25,000 rpm. Unit is self-contained and requires no batteries or other external power source. It consists of a precision-built d-c magneto generator that produces a voltage directly proportional to the speed being measured, calibrated in conjunction with an easily-read laboratory type indicator having four overlapping speed ranges. Electric Tachometer Corp., 2218 Vine St., Philadelphia 3, Pa.



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FOR WET FELTS

plus patented features that give greater value.

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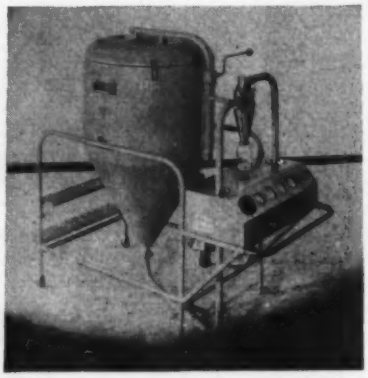
RODNEY HUNT MACHINE COMPANY

18 Maple Street, Orange, Mass., U.S.A.

Spray Drier

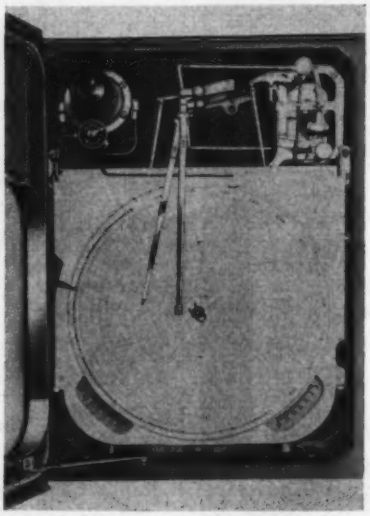
Portable unit features high-speed atomizer head.



This compact laboratory unit is particularly designed for experimental work in universities, laboratories and small scale production in pharmaceutical and industrial organizations. The atomizer head rotates at 50,000 rpm, ejecting the liquid product as a fine mist into the drying chamber where circulating warm air instantaneously evaporates the water content. The unit may be easily wheeled from one location to another. Equipped with both electrical and gas heating elements. Niro Corp., 52 Broadway, New York, N. Y.

Control Instruments

Only one calibration adjustment.



These air-operated control instruments are offered in five types of control action; on-off, proportional, reset, derivative, and reset plus derivative, and are readily convertible from one type to another. Reset rate, derivative time, and proportional band adjustments are accurately calibrated and reproducible. Controllers can be completely disassembled and after being reassembled, with replacement parts; only one adjustment is required to put the system in exact calibration. The Bristol Co., Sales Promotion Dept., Waterbury, Conn.

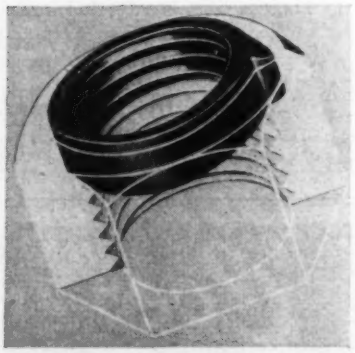
Pump

Actually runs continuously without metal to metal contact.

New turbine type pump has impeller fastened firmly to an enlarged shaft by a lock nut and a woodruff key, thus eliminating metal to metal contact. Another feature is sealed in grease ball bearings to insure a prolonged pump life, and eliminate the dangers of bearing rust or improper lubrication. Bearing end-play is eliminated by use of a preloading spring under the outer adjusting nut. Roy E. Roth Co., Rock Island, Ill.

Locknut

Can be applied in either direction.



Consisting of a standard steel nut and a slightly elliptical retainer ring combined in a single unit, this new locknut stays put exactly where it is positioned by wrenching, even when vibration is so violent as to destroy the bolt itself. Automatic locking of the nut on the bolt does not require bolt tension. When the retainer grips the bolt on which the nut is applied, bolt load or stress is borne entirely by the nut. Position of the nut on the threaded portion of the bolt or other threaded part can be readjusted at any time. Security Locknut Corp., 1815 N. Long Ave., Chicago 39, Ill.

Grinder

For knives up to 220 inches in length.

End to end precision grinding can be accomplished with this seven ton model which is designed to handle accurately and with ease any heavy chipper knife, sheer blade, paper cutting knife and doctor blade up to 220 in. in length. This model is equipped with two motors; one of 15 hp. to handle the 20 in. segmental grinding wheel and the other of 3 hp. to guide the traverse carriage. It is also being manufactured in 90, 100, 110 and 134 in. sizes. Grinders for knife lengths of 238 in. are available on special order. S. C. Rogers & Co., 191 Dutton Ave., Buffalo 11, N. Y.

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GRINDING WHEELS—SEGMENTS for
SAW SHARPENING
SAW GUMMING
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Money-Saving Tip from *Kalamazoo*

"LINE OLD TANKS WITH KALAMAZOO GLAZED TILE"

It isn't always necessary to replace old concrete tanks that are pitted and letting sand get in your stock. Such tanks make an ideal base for Kalamazoo Glazed Tile. Gives you a "new" tank *at low cost* that will last for years and years without attention. Tile lets you modernize your chests and improve agitation with midfeathers and rounded corners. Write for full particulars—no obligation, of course.

Kalamazoo TANK and SILO COMPANY

227 HARRISON STREET **KALAMAZOO, MICHIGAN**

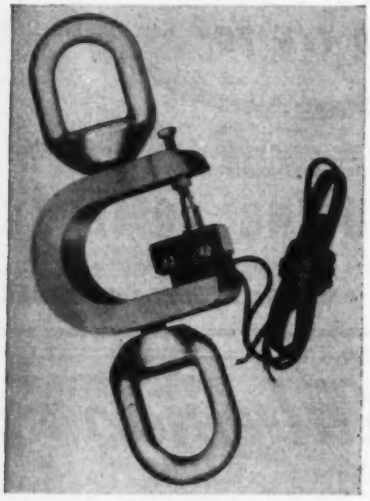
Paper Scoop

Can be raised as much as 230 inches to required storage level.

Paper scoop and roll clamp, capable of handling and stacking rolls of paper up to 50 in. diameter, weighing up to 5,500 lb., are available for lift trucks. Blade of the hinged paper scoop is inserted under the roll which is then held tightly by a hydraulic clamping arm. The roll can be tilted from end to side position or vice versa. The scoop is manually adjusted for a tilt of 0 to 3 deg. and is constructed to allow the load to roll off into position when clamp is released. Towmotor Corp., 1226 E. 152nd St., Cleveland 10, Ohio.

Hoist Overload Protection

Broken chains or cables on hoists and cranes can be prevented.



Protection is provided by the new and improved Dyna-Switch which has been redesigned with a heavily constructed bar, a high capacity micro-switch, and large, high rated eye-bolts to fit most standard hooks. It can be set to cut off at any poundage between 500 and 10,000 lb. Cut off or operating point can be changed at will in the field by suspending a known weight from the unit and adjusting the set screw provided for this purpose. W. C. Dillon & Co., Inc., 5410 West Harrison St., Chicago 44, Ill.

Briefs . . .

▸ FIRE EXTINGUISHERS—These 2½-gallon foam, soda-acid, and anti-freeze water type Silicon bronze fire extinguishers are 2 pounds lighter weight and 65 per cent stronger than the drawn-shell models they replace. Ultimate shell strength is 1400 lb. psi. American-LaFrance-Foamite Corp., Elmira, N. Y.

▸ CONCRETE MIXER—Portable 147 lb. concrete mixer is available with either hand drive or electric or gasoline engine power. Mounted on hardwood skids but pneumatic-tired trailer is available. Capacity, 3 cf wet mix per batch. Mixing time, less than 2 min. Denver Equipment Co., Dept. 169, Denver, 17, Colo.

▸ DEHUMIDIFIER—Compact and streamlined adsorption type dehumidifier for both domestic and light commercial use is effective for humidity control in adaptable areas up to 8000 cf. Its 1/100 hp. motor operates a rotor type of fan which moves 32 cf of air a min. through the unit. Dryomatic Corp. of America, 1600 Union Ave., Baltimore 11, Md.

▸ TORQUE MEASUREMENT—Overcomes maintenance troubles that occur in measuring devices subjected to the vibration present in high-speed centrifuge operation. To maintain the load on the solids removal screw conveyor of the centrifuge at a constant safe maximum value, torque of the planetary gear that drives the screw conveyor is measured by an air-operated force measuring device, the "Thrustorq," and automatically controls the slurry feed to the centrifuge. Hagan Corp., 3300 Hagan Bldg., Pittsburgh, Pa.

▸ BRIDGE CRANE—Tramrail crane of floating suspension design increases efficiency and reduces operator fatigue because of less drawbar pull which provides faster operation while increasing payload capacity. The company has developed maximum area and volume hook coverage by closer end approach on bridge and runway and by maximum headroom utilization. Forker Corp., 2122 Random Rd., Cleveland 6, Ohio.

▸ OSCILLOGRAPH—Can be used either for visual indications or for taking oscillograms of current and voltage phenomena. Standard model is equipped with two elements, but can also be furnished with three or four if desired. Apparatus News Bureau, General Electric Co., Schenectady 5, N. Y.

▸ MATERIALS HANDLING—One to four drums or barrels of material can be handled at the same time with the four-drum-handling arms available for the Hyster load-grab attachment mounted on the "40" lift truck. Drums may be lifted in either horizontal or vertical position. Hyster Co., 2902 N. E. Clackamas St., Portland 8, Ore.

▸ WIRE CONNECTOR—Designed for joining wires up to 4 No. 18, particularly in production wiring. Made of the highest grade porcelain. Inside of skirt is threaded from one end of connector to the other which makes it easier to insert wires and to screw connector on. Threads hold insulation up inside connector so tripped wire ends are completely covered and protected. Ideal Industries, Inc., 4162 Park Ave., Sycamore, Ill.

Chipper Drives

(Continued from page 1355)

and the starting current full voltage, 300 to 400 per cent. The synchronous motor must be unloaded for normal starts until up to speed and field applied, or unloaded if pulled out of step until up to speed and field re-applied. The synchronous motor requires d-c excitation from some source and the motor control is more complicated and more expensive than the control for a squirrel-cage motor.

The squirrel-cage motor and control for full voltage starting is the most simple. The motor is least expensive in the higher speeds; consequently, it is usually belted. The squirrel-cage motor starting current may be 500 to 600 per cent of normal for full voltage. The available starting torque may be 150 per cent and maximum torque 250 per cent.

One important fact often overlooked is that the energy of the rotating parts is equal to the energy loss or heat in the rotor circuit during the starting period. This fact places the comparatively small rotor or bars of the squirrel-cage motor at a disadvantage as compared to the larger diameter, more spacious poles, and squirrel-cage winding in the poles of the synchronous motor. The wound rotor motor, of course, has the external resistance to dissipate most of the heat outside the motor on starting, and this resistance limits the current and results in better power factor during starting. All this makes the wound rotor motor better from the starting consideration than the synchronous or the squirrel-cage motor.

The belted drive has a maintenance problem. It may require an extra jack shaft or a larger base with a third bearing to withstand bearing loading due to belt pull. The belted job requires more space for installation, also the belts and pulleys may be hazardous to the personnel.

The control for the squirrel-cage motor is simple and the least expensive unless reduced voltage or part winding starting is necessary because of power supply limitations.

The wound rotor motor can be used direct connected or belted. It, and its primary and secondary control, are more expensive per hp. than either the synchronous or the squirrel-cage motor and control. Its starting torque is proportional to its secondary current which may be controlled by the resistance in the secondary circuit. The starting torque is usually set up for about 150 per cent, or 150 per cent normal current, thus the wound rotor motor is the easiest on the power supply during starting. The running torque characteristics curve is similar to the curve of a squirrel-cage motor as its slip rings are shortened when up to speed.

By leaving a resistance in the secondary circuit during normal running conditions, it is possible to handle peak mechanical loads with lesser electrical demand peaks by allowing the speed to droop and using part of the stored energy of the flywheel or rotating mass. This energy must be restored to the rotating mass by the motor so that the end result is a longer duration of a lesser demand rather than a short duration high peak.

A wound rotor motor with a permanent resistance in the secondary gives a slower build-up and drop-off of load than either the synchronous or squirrel-cage or the wound rotor motor without resistance in the rotor circuit. This behavior may be used to an advantage if the power supply has to be favored to lessen the voltage or frequency regulation that otherwise might be detrimental to operation. It may also be utilized to chip larger diameter logs than could be handled without the slowing down or using of stored energy.

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Thousands of WELDCO-covered rolls are used in pulp and paper mills, textile, food and chemical plants throughout the country, for WELDCO rolls give long, economical service with a minimum of maintenance. The WELDCO patented process, using Monel, Stainless Steel, Nickel, Inconel, and other alloys, can be applied to new or reclaimed rolls, eliminating the expense of new cores and providing substantial operating economies. It is not an electroplate or sprayed coating, but a layer of solid rolled metal, applied to the base roll uniformly, tightly, and with careful precision.

To cut your operating costs, take your roll problems to The Youngstown Welding & Engineering Company, specialists in rolls and roll coverings for many years. Let WELDCO engineers help you select the materials best suited to your processing requirements.

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H & K PERFORATED METALS

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- √ Pulp Screens
- √ Digester Bottoms

- Smooth, easy-to-clean surfaces
- Accurate and uniform hole sizes
- Standard or special perforations
- Stainless steel and corrosion resisting alloys a specialty
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The Paper Industry New Literature

Books

MODERN PACKAGING ENCYCLOPEDIA. Published by Breskin Publications, 122 E. 42nd St., New York 17, N. Y. 1950. 8½ x 11½. 932 Pages. $5.00. $6.00, Canada. $7.00, abroad.

Eighty-four authorities have contributed to this annually published volume on scientific packaging. The latest techniques and descriptions of how they can be used to cut production and distribution costs and to increase retail sales are presented.

The first chapter, "Packaging Achievements," is a new feature of the 1950 edition, which reports and analyzes the successful methods used by 81 of America's largest manufacturers to solve urgent packaging problems. These case histories cover cameras, tools, foods, cigarettes, candy, pharmaceuticals, etc., with the entire section well illustrated.

Instructions on the selection of packaging machinery and materials, the pre-testing of package design, the legal requirements of packaging, the treatment of the outer surface of containers, and the effective use of package displays to increase sales at the point of purchase are covered in other sections of the Encyclopedia. Detailed treatment on methods of packaging for shipment and selection of proper package form for specific products are given. The Buyers' Directory entails more than ninety pages with complete listings of all known manufacturers and suppliers of packaging machinery, services, materials, equipment and supplies.

Indices are Table of Contents, Alphabetical, Industries Served, Package Forms, and Machinery and Equipment.

LANGE'S HANDBOOK OF CHEMISTRY. Seventh Edition. Compiled and edited by N. A. Lange. Published by Handbook Publishers, Inc., Sandusky, Ohio. 1949. 1934 pages. 5⅜ x 7¾. Fabricoid covers. $7.00.

As in previous editions, many changes in numerical values scattered throughout the book have been made. Primarily a compilation of physical data, the physicists as well as chemists will find the handbook a ready reference for use in laboratory work and manufacturing.

An abridged table of contents include elements, in organic compounds, organic compounds of which 6507 different compounds are listed, analytical chemistry, physical chemistry, industrial chemistry, tables, and an index of twenty-five pages listing more than 3000 entries.

Because of the addition of essential information, a portion of the mathematical data which appeared as an appendix in all previous editions has been eliminated. A list of tables now offered for the first time are Abundance of the Elements, Glyceride Content of Drying Oils, Properties of Hormones, ASTM Classification of Coals by Rank, Formulas for Calculating Mineral-Free BTU and Fixed Carbon, Density of Fuming Sulphuric Acid Solutions, Dielectric Constants, Dipole Moments, Mass of Water in Saturated Air, Partial Pressures of Aqueous Ammonia Solutions, Kopp's Rule for Calculating specific Heat, Logarithms of Equilibrium Constants, Viscosity of Aqueous Sucrose Solutions and Viscosity of Aqueous Ethyl Alcohol Solutions. Several tables have been extended or completely rewritten, such as Periodic Chart of the Elements, Description of the Elements, Table of Isotopes, Plastics and Synthetic Rubbers, Composition and Use of Foods, Typical Analyses of Various Public Water Supplies, Corrosion and Heat Resistant Alloys, and others.

Explanations precede tables of numerical data, and footnotes of organic compound tables show position of listing for more than 3600 synonyms.

PRECISION MEASUREMENT. By Jack Johnson. Published by Pitman Publishing Corp., 2 W. 45th St., New York 19, N. Y. 1949. 181 pages. 5½ x 9. $3.00.

This book attempts to bridge the gap between school-book theories and the practical applications of these theories that confront the tool engineer. The problems presented in the text have been taken directly from practical uses in the shop and the solutions are given with the utmost care and simplicity, and through the use of numerous setup drawings and sketches the theory behind the solution is clearly shown. The uses of balls, discs, or pins in determining the answers to problems are demonstrated. Many jobs can be solved in this way only, and the setups illustrated in this manual can save days of time and labor.

SUPERVISOR'S MANAGEMENT GUIDE. Edited by M. Joseph Dooher and Vivienne Marquis. Published by American Management Association, 330 W. 42nd St., New York 18, N. Y. 1949. Looseleaf, leather bound. 190 pages. $3.00 to AMA members. $3.50, non-members.

Eight sections comprising twenty chapters deal with case histories and discussions of successful supervisory programs and techniques developed by companies in all types of industry, and assist supervisors, foremen and operating executives to apply new developments in management methods for improving human relations in business.

The eight sections are: Constructive Work Relations; Morale—The Keystone of Sound Employee Relations; The Qualities of Leadership, Developing Skill in Communication; Getting Results from Conference Training; How do you Rate as a Supervisor?; Management Policy and Goals; and A Human Relations Reading List. The chapters cover basic principles of sound human relations, supervisory attitudes and practices and their effects on worker morale and productivity, executive responsibility for developing morale, dealing with emotional problems on the job, art of speaking effectively to employees, tests for determining competent supervisors and executives, and related subjects.

REFERENCE TABLES. Published by Canadian Pulp and Paper Association, Sun Life Bldg., Montreal, Quebec, Canada. Paper bound. 8½ x 11. 33 pages. Free.

Divided into six sections, comprising a total of 87 tables, this booklet gives a picture of pulp and paper operations, their intimate relationship with the forest resources and forest crop, and something of the importance of the industry in the economy of Canada.

A bird's-eye view of the operations of the industry from its pulpwood harvest to its market is found in one section. In another, not only are figures shown revealing the national significance of the industry, but also general statistics covering its operations as a whole.

Production and other figures of Newfoundland are shown separately at the end of the book. Canada's pulp and paper industry is summarized on the last two pages in 30 informative statements. Tables are indexed.

Booklets and Pamphlets

TANSTAAFL. A Plan For A New Economic World Order. By Pierre Dos Utt. Published by Cairo Publications, 302 5th St., S.E., Canton, Ohio. 8½ x 11. 75c. Everyone in America must be concerned with his country's current economic problems. The author of this booklet undergoes such a serious reaction that he is introducing to the people a new plan to solve all economic ills, and brings out a most startling, but inevitable, explanation. Well worth reading.

WESTINGHOUSE ENGINEER. Mid-century review issue of the bi-monthly Westinghouse Electric Corp. publication. 96 pages, with elaborate charts, illustrations and tables. A complete summary of the important engineering events in which Westinghouse has participated since 1900, with a forecast of what engineering achievements may be anticipated in the future. Includes brief biographies on noted Westinghouse personalities who have contributed articles to this issue;

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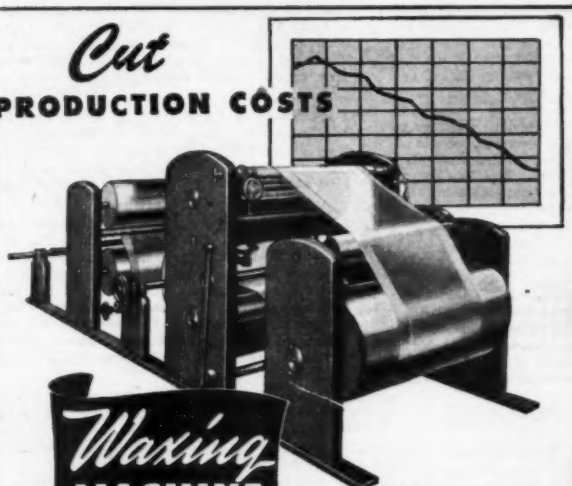

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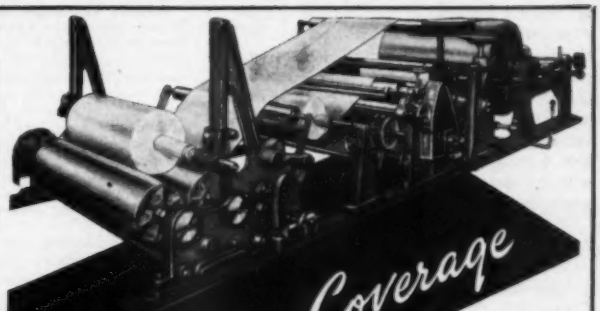

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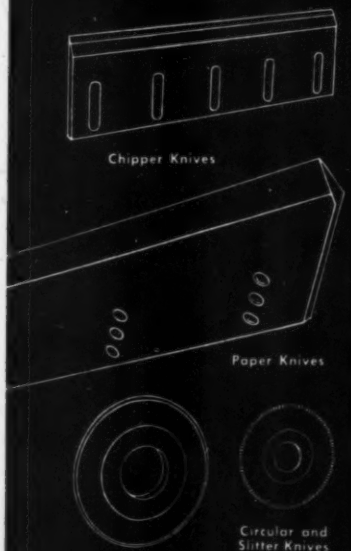

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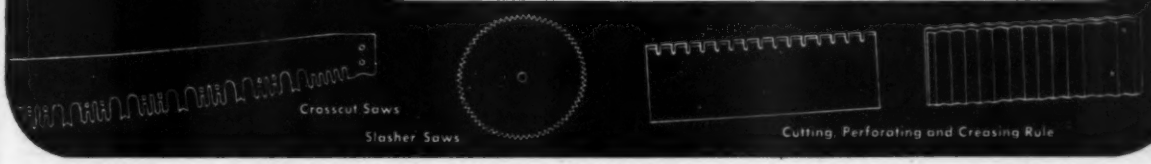


articles are histories of numerous important engineering appliances and discoveries. Such things as light, transformers, transmission and distribution systems, and electrical drives are traced from their inception, to present day improvements, and potential developments. This booklet is done in magazine format, 8½ x 11½ in. The material, with its accompanying illustrations and artwork, displays the ultimate in graphic art.

1950 DIRECTORY OF OCCUPATIONAL SAFETY POSTERS. Published by National Safety Council, 20 N. Wacker Drive, Chicago 6, Ill. 72 pages. 50c each. 744 posters, designed for use in various industries and occupations related thereto, are grouped in subject classifications. Two-color posters are presented in black and white, and four-color posters are reproduced in color. Dimensions shown below each illustration indicate size in which that particular poster is available. Four general rules are cited in making the safety poster program more successful. Poster prices are given. Table of contents, index, and poster numerical listing are included.

WHAT'S THE ANSWER? Published by the Chamber of Commerce of the United States, Washington 6, D. C. 12 pages. 25c. The booklet, which is intended as a guide for company researchers who handle requests for information about business activities, lists a minimum library for such researchers and suggests other sources of information.

Manufacturers' Publications

Through the co-operation of manufacturers and suppliers, THE PAPER INDUSTRY *lists the following catalogues, bulletins, and booklets. They may be obtained without cost or obligation, unless otherwise specified, by writing direct to the manufacturers. Please address requests on your company letterhead.*

Valves. The Duriron Co., Inc., Dayton 1, Ohio—2-page Bulletin 636 describes and illustrates the new Durco Type A lubricated straightway corrosion resisting plug valves. Dimensional table and cross section photograph are included. Bulletin 637 describes and illustrates the Durco Type B 175 lb. lubricated straightway corrosion resisting plug valves. Bulletin 638 describes and illustrates the Durco Type B bottom lubricated plug valve. Dimensional tables and sectional photographs are given in both these bulletins.

Silicone Resin. Dow Corning Corp., Midland, Mich.—5-page mimeographed data sheets describe DC 1107, a colorless silicone fluid, used in treating paper to form a water repellent and nonadhesive surface. Properties, methods for application, different preparations with the product, and descriptions of other silicone products are included.

Centrifugal Pumps. Goulds Pumps, Inc., Seneca Falls, N. Y.—8-page Bulletin 725-3 describes and illustrates stainless steel centrifugal pumps designed for handling corrosive liquids. Materials of construction, parts list and interchangeability chart, performance curves, specification and dimensional tables are shown.

Water Conditioning. Graver Water Conditioning Co., 216 W. 14th St., New York 11, N. Y.—8-page Bulletin WC-100 outlines products, services and background of this company. Illustrations of large installations of hot-process and zeolite softeners, demineralizers, clarifiers, filters, etc. are included.

Blowers and Exhausters. Roots-Connersville Blower Corp., Connersville, Ind.—24-page revised Bulletin 120-B-14 covers the centrifugal blowers and exhausters manufactured by this company. Six pages are devoted to design and construction features of single stage units, with illustrations of the various types, and equal space is devoted in a similar manner to the multi-stage units. Both sections include illustrations such as cross-sections, diagrams, curves, exploded views, etc. The subject of regulation, accompanied by cuts showing approved regulating devices is given, followed by three pages of typical installations of both the single and multi-stage R-C Centrifugals. Operating characteristics are given.

Spectrometer. Consolidated Engineering Corp., 620 No. Lake Ave., Pasadena, Calif.—8-page, 2-color bulletin entitled "Consolidated-Nier Isotope Ratio Mass Spectrometer, Model 21-201" covers the application of the instrument to the use and measurement of stable rare isotopes. List of typical stable isotopes and uses are given. Illustrated.

Electronic Controls. Photoswitch Inc., 77 Broadway, Cambridge 42, Mass.—65-page booklet entitled "Cutting Production Costs with Electronic Controls" contains 45 case studies describing actual examples of cost-saving production techniques, shows how photoelectric and electronic controls solve problems and prevent bottlenecks in industry. Catalogue information not included. Indexed.

Excavators and Hauling Equipment. Power Crane and Shovel Ass'n., 74 Trinity Place, New York 6, N. Y.—24-page Bulletin No. 3 deals with the proper sizing of excavators and hauling equipment. Various factors affecting efficient operation on a job are analyzed. Performance tables in relation to factors involved are given.

Water Softener. Worthington Pump and Machinery Corp., Harrison, N. J.—16-page Bulletin W-212-B5 describes and illustrates a cold process slurry type precipitating water softener and coagulator. A flow diagram, charts, and two installation photographs are included. Old and new precipitating systems are described.

Centrifugal Pumps. The Duriron Co., Inc., Dayton 1, Ohio—12 page Bulletin 812A is a revised instruction booklet on the installation and operation of centrifugal pumps in corrosive service. Included are friction data, formulas for figuring capacity, head and horsepower, and conversion data.

Casting Alloy. The Cooper Alloy Foundry Co., Hillside 5, N. J.—4-page Bulletin 5M-8/49 presents complete data covering the properties and uses of CF-8M, casting alloy similar in composition to Type 316 stainless. A clear picture of the alloy's wide range of applications is given.

Calender Rolls. Farrel-Birmingham Co., Inc., Ansonia, Conn.—16 page illustrated Bulletin No. 116 tells how chilled iron rolls are made, describes the company's roll manufacturing facilities, and explains why the roll maker's experience, skill and equipment are reflected in the quality of the finished product. Paper machine and board calenders, roll grinders, calipers and speed reducers are also illustrated and briefly described.

Furnace Meters. Fischer & Porter Co., Hatboro, Pa.—2 page Pub. 10070 describes and illustrates the new furnace Floguide meter for the measurement of gas flow rates. Capacity and dimensional table included.

Portable Ventilators. Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.—2 page leaflet describes and illustrates portable ventilators. Specifications for belt-drive model and direct-drive model are given.

Floodlights. General Electric Co., Schenectady 5, N. Y.—4 page Bulletin GEC-537 describes and illustrates heavy duty floodlights. Photometric data, dimensional drawings, and accessories and parts tables are included.

Worm Gear Reducer. The Cleveland Worm & Gear Co., 3249-59 E. Eightieth St., Cleveland 4, Ohio—8 page bulletin describes and illustrates many Speedaire fan-cooled worm-gear speed reducer installations.

Identification Label. W. H. Brady Co., 815 N. Third St., Milwaukee 3, Wis.—Bulletin No. 144 describes and illustrates self-adhesive pipe marker for identifying small diameter pipe and conduit from ¼ inch to 2 inches dia.

Turbines. De Laval Steam Turbine Co., Trenton 2, N. J.—24 page Catalogue No. 4200 includes a discussion of the economics of by-product power, together with diagrammatic sketches showing utilization of heat for various typical plant operating conditions. Photographs showing design features of the turbines and cut-a-way diagrams showing various governing and control systems are included.

Electric Furnaces. Burrell Corp., 1942 Fifth Ave., Pittsburgh 19, Pa.—6-way folder describes and illustrates Temco electric furnaces for general laboratory use and heat-treating. Sizes available and prices are given.

Starters. Allis-Chalmers Mfg. Co., 991 S. 70th St., Milwaukee, Wis.—4 page Bulletin 14B7274 describes the oil-immersed, full-voltage Type 371 wall-mounted starter for control of squirrel cage motors and the primary of wound rotor motors of 350 hp. or less at 2300-V. Wiring and dimensional diagrams included. Illustrated.

Oil Cups and Gauges. Trico Fuse Mfg. Co., 2948 No. 5th St., Milwaukee 12, Wis.—2 page Bulletin No. 31 describes and illustrates combination oil cups and oil gauges. Diagrams, dimensions and list prices are given.

Stockroom Equipment. Precision Equipment Co., 3710 N. Milwaukee Ave., Chicago 41, Ill.—12 page catalogue contains descriptions, photographs, dimensions and prices of lockers, parts bins, steel shelving, drawers, etc.

Turntables. Hardinge Co., Inc., 240 Arch St., York, Pa.—4 page Bulletin No. 48 describes and illustrates pressed steel turntables. Standard sizes and weights table given. An index of Hardinge bulletins is included.

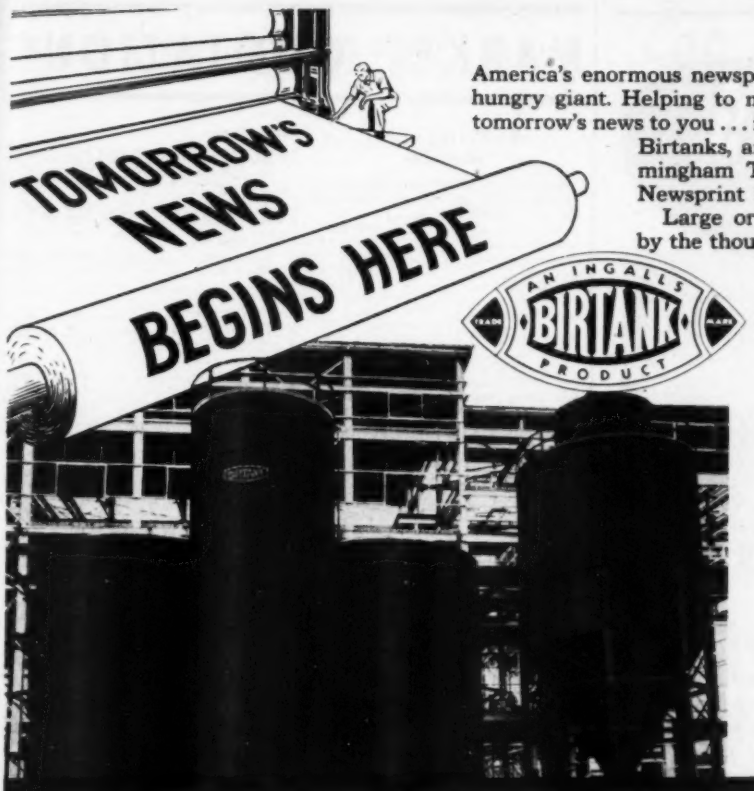
Compression Distillation. Arthur D. Little, Inc., 30 Memorial Drive, Cambridge 42, Mass.—4 page folder describes the principles of compression distillation and its present industrial applications. Illustrated with diagrammatic sketch and photograph of installation.

Waste Treatment. American Well Works, Aurora, Ill.—24 page Manual No. 149 graphically illustrates and describes processes and equipment for sewage and industrial waste treatment. It includes activated sludge, bio-activation, jet aeration, mechanical aeration, screening, grit removal, etc. Indexed and classified by treatment processes.

Sterilizers. Burrell Corp., 1942 Fifth Ave., Pittsburgh 19, Pa.—6-way folder describes the new Barnstead insulated sterilizer for laboratories. Illustrated with diagrammatic sketch and photographs. Dimensional tables included.

Magnetic Equipment. Dings Magnetic Separator. Co., 4740 W. Electric Ave., Milwaukee 14, Wis.—8-page illustrated Bulletin No. C-5000A describes electric and nonelectric magnetic pulleys, nonelectric magnetic drums, triple pole rectangular magnets, lifting magnets, nonelectric plate magnets, high intensity induced roll and cross belt magnetic separators and other types of equipment. Specifications, applications, and features are included.

Equipment Cleaning. Oakite Products, Inc., 116 Thames St., New York 6, N. Y.—20-page booklet entitled "How To Clean and Maintain Air Conditioning and Refrigerating Equipment at Less Cost" reviews latest equipment-cleaning and descaling procedures, as well as simplified water-treatment techniques for controlling slime, algae and scale.



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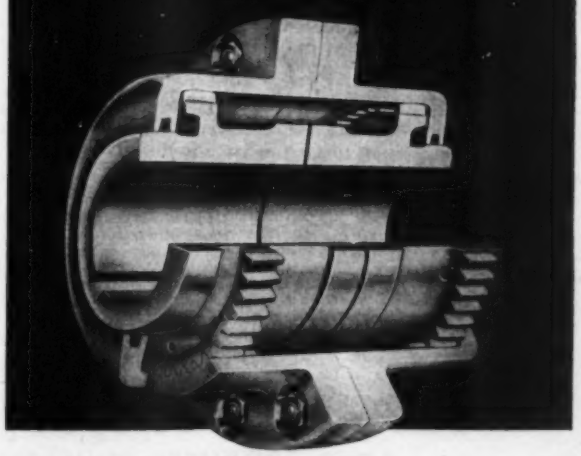

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Corduroy, Ladies'	3.75 to 4.00
Washables, No. 1	3.00 to 3.25
Percales	6.00 to 6.25
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Khaki Cuttings—	
Bleachable	4.50 to 4.75
Unbleachable	4.00 to 4.25
New White Canvas	11.00 to 11.50
New Mixed Blacks	3.50 to 3.75
Canton Flannels, Bleached	10.75 to 11.00
Shirt Cuttings—	
New White No. 1	10.75 to 11.25
White Shrunk	10.00 to 10.25
Silesias No. 1	6.50 to 6.75
New Unbleached	10.75 to 11.25
Fancy	5.25 to 5.50
Linen Cuttings—	
American	8.00 to 8.25
White	14.00 to 15.00
Grey	13.50 to 14.00

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No. 2	1.50 to 1.55
No. 3 and No. 4	1.25 to 1.35
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Repacked	3.00 to 3.25
Thirds and Blues—	
Repacked	2.75 to 3.00
Miscellaneous	2.25 to 2.50
Whites, No. 1—	
Repacked	4.50 to 4.75
Miscellaneous	3.25 to 3.50
White, No. 2—	
Repacked	3.25 to 3.50
Miscellaneous	2.75 to 3.00

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	per cwt.
New Dark Cuttings	Nominal
New Mixed Cuttings	
New Light Silesias	
Light Flannelettes	
Unbleached Cuttings	
New White Cuttings	
New Light Oxfords	
New Light Prints	

RAGS (Foreign)

ex dock New York City

OLD RAGS

	per cwt.
No. 1 White Linens	Nominal
No. 2 White Linens	
No. 3 White Linens	
No. 4 White Linens	
No. 1 White Cottons	
No. 2 White Cottons	
No. 3 White Cottons	
No. 4 White Cottons	
Extra Light Prints	
Ord. Light Prints	
Med. Light Prints	
Dutch Blue Cottons	
French Blue Cottons	
French Blue Linens	
Checks and Blues	
Linsey Garments	
Dark Cottons	
Old Shopperies	

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No. 1 large	5.50 to 5.75
No. 1 small	4.50 to 4.75
Sisal Rope—	
No. 1 large	5.00 to 5.25
No. 1 small	4.50 to 4.75
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Jute Threads—	
Foreign (Nom.)	6.50 to 7.00
Domestic	6.00 to 6.50
Strings—	
No. 1 sisal	4.50 to 4.75
No. 2 sisal	4.00 to 4.25
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Extra Manilas	35.00 to 40.00
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Kraft—	
New Envelope Cuttings	60.00 to 65.00
Tripled Sorted No. 1 100%	30.00 to 35.00
New 100% Cor. Cuts	30.00 to 35.00
No. 1 Old Assorted	25.00 to 27.50
News—	
White Blank	55.00 to 60.00
Overissue	18.00 to 19.00
No. 1 Folded	14.00 to 15.00
Old Corrugated Containers	18.00 to 20.00
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Alum (Papermakers)—	
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Ground, cwt.	3.80—
Powdered, cwt.	4.20—
Blanc Fixe—	
Pulp, bulk, ton	80.00—
Dry, barrels	85.00—
Bleaching Powder—	
Drums, cwt.	4.50 to 5.00
Casein (Domestic Standard)	
20-30 mesh (bags), lb.	
80-100 mesh (bags), lb.	23.00 to 24.00
Argentine, lb.	20.00 to 20.50
China Clay—	
Domestic Filler Bulk (mine) ton	10.00 to 15.00
Domestic Coating Bulk (mine) ton	15.00 to 25.00
Imported (ship side) Bulk (lump) ton	22.00 to 30.00
Chlorine—	
Tank cars (wks) cwt.	2.40 to 2.70
Gelatine (silicin), lb.	1.25 to 1.35
Glyc. (C.P.) drums, lb.	.24½ to .25
Litharge, powd. bbl. lb.	.13¾ to .14¾
Rosin (Gum)—	
New York, per 100 lbs.	
E	7.50—
F	7.50—
G	7.50—
WWX	8.00—
Rosin (Wood), carlots, F.O.B. South	5.50—

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Bulk (works), cwt.	1.00 to 1.15
Paper Bags, cwt.	1.25 to 1.35
Soda (Caustic)—	
Solid drums, cwt.	3.05 to 3.10
Ground and flake, drums, cwt.	3.45 to 3.50
Sodium Silicate—	
60 deg. 55 gal. drums, (works) cwt.	1.65 to 2.05
40 deg. 35 gal. drums, (works), cwt.	.80 to 1.45
Starch—	
Pearl, 140 lb. bags, cwt.	4.72—
Pearl, barrels, cwt.	4.72—
Paper, (Sp.) bags, cwt.	4.72—
Powdered, barrels, cwt.	4.83—
Sulphur (Crude)	
(Mine) bulk, long ton	18.00—
Talc—	
Dom. 100 lb. bags (mine) ton	22.00 to 28.00
Canadian	35.00 to 45.00
Titanium Dioxide—	
Barium Pig, bbls., lb.	.19½ to .21
Calcium Pig. bbls., lb.	.19½ to .21
Zinc Sulphide, bbls., lb.	11.50 to 11.75

WOOD PULP

Prices, dollars per short, air dry, ton, with inland freight allowed, are:

Bleached sulphite, Swed.	118.00 to 122.00
Bleached sulphite, Finnish	118.00—
Bleached sulphite, dom.	118.00—
Easy bleaching sulphite	—
Unbleached kraft, Finn.	—
Unbleached sulphite, Swed.	100.00 to 103.50
Unbleached sulphite, Fin.	—
Unbleached sulphite, dom.	100.00—
Unbleached kraft, Swedish	82.50—
Unbleached kraft, northern	82.50—
Unbleached kraft, southern	80.00—
Bleached sulphate, Swedish	126.00 to 128.00
Bleached soda, domestic	113.00—
Sulphite screenings, dom.	40.00 to 50.00
Sulphate screenings, dom.	40.00 to 50.00
Groundwood, domestic and Canadian	65.00 to 67.50

PAPER

f.o.b. New York City

Boards—	per ton
Binders	94.00—
Chip	70.00—
Chip, tube and can	75.00—
Chip, full blending	77.50—
Chip, sgl. mla. lined	77.50—
Coated, white patent .018	110.00—
.020 and heavier	100.00—
Kraft liner	95.00 to 100.00
Filled News	72.50—
Container	85.00—

Book Papers—f.o.b. mill with quantity, weight, manufacturing and other differentials allowed:

(Per cwt. in ton lots)
Uncoated (Untrimmed)

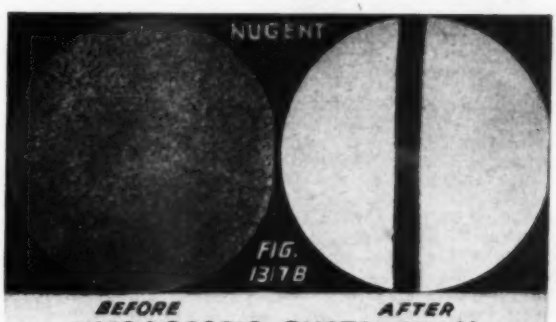
Book, White (M. F.)—	
A Grade E. F.	15.40—
B Grade E.F.	14.90—
A Grade S. C.	15.90—
B Grade S. C.	15.40—
No. 2 Uncoated Offset 4 sides, White	—
Machine Coated White (Trimmed 4 sides)	
No. 1 Glossy	19.75—
No. 2 Glossy	19.25—
No. 3 Glossy	17.75—
No. 4 Glossy	—
No. 2 Offset	15.15—
CIS Litho (Varnish)	—
CIS Litho (Non-Varnish)	—

Writing Papers—f.o.b. mill with zone, quantity, packing and other differentials allowed:

Rag Content Bond— (In Ton Lots)	per cwt.
Extra 100% Rag	51.40—
100% Rag	44.55—
75% Rag	33.90—
50% Rag	28.10—
25% Rag	24.85—

Rag Content Ledger— (In Ton Lots)	per cwt.
Extra 100% Rag	52.65—
100% Rag	45.65—
75% Rag	35.15—
50% Rag	29.40—
25% Rag	26.15—
Sulphite Bond—	per cwt.
Air dry, watermarked	—
No. 1 watermarked	17.50—
No. 2 watermarked	16.40—
No. 4 watermarked	15.60—
Sulphite Ledger—	per cwt. Zone
No. 1 watermarked	18.80—
No. 2 watermarked	18.05—
No. 4 watermarked	17.50—
Glassine (f.o.b. mill)—	per cwt.
Embossed (25 lb. up)	—
Bleached (25 lb. up)	—
Unbleached (25 lb. up)	—
Greaseproof— Bleached (25 lb. up)	—
Unbleached (25 lb. up)	—
News—	per ton
Rolls, Standard Contract)	100.00 to 103.00
Rolls (Spot)	(Nominal)
Sheets	119.00—
Tissues (Carlots)—	per ream
White No. 1	1.55—
White No. 2	1.20—
Bleached Anti-Tarnish	—
Colored	—
Anti-Tarnish Kraft	1.37½—
Manila	1.60—
Napkins, semi-crepe (12½ lb. to M shts.) per cs.	.80—
Napkins, full crepe and emb'sed (12½ lb. to M shts.) per cs.	.80—
Toilet, Bleached (M. shts.) per cs.	6.80 to 6.95
Toilet, Unbleached (M. shts.) per cs.	5.75—
Towels—	per case
Bleached	5.25—
Unbleached	4.50—
Wrappings (Kraft)—	per cwt.
Super-Standard	8.00 to 8.50
No. 1 Wrapping	7.00 to 7.50
Standard Wrapping	6.25 to 6.75
Standard Bag	6.00 to 6.25
Variety Bag	—
Wrappings (Sulphite and Bleached Kraft)— (Rolls, f.o.b. mill)	
Bleached Papers—	per cwt.
M.F. & M.G. Waxing, 20 lb. (Carloads only)	—
(10,000 lb.)	—
Drug wrapp., 25 lb.	—
Unbleached Papers—	
Com. Gr. Butch. 40 lb.	—
No. 1 Butchers	—
No. 1 Imit. Parch. & Dry Fin. Groc. Sulphite, 30 lb.	—
No. 2 Imit. Parch. & Dry Fin. Groc. Sulphite, 30 lb.	—
Steam Finish, 50 lb.	—
Water Finish, 50 lb.	—
Manilas—	
Envp. Mla., Sub. 16-40 (No. 1)	—
Envp. Mla., Sub. 16-28 (No. 2)	—
Envp. Mla. (Prices based on large sheets untrim'd ream marked, in bdls.)	—
Wrapp Mla. 35 lb. up—	
No. 1	—
No. 2	—
M.G. Sulphite and Kraft (other than Waxing)	
Grade B30 lb.	—
Grade A-22 lb.	—

Can your lubricating oil filters match this cleaning power?



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ABSORBENT OIL FILTERS
GET 99.8% OF THE DIRT!

The "before and after" photomicraghs reproduced above are positive proof of the ability of Nugent Filters to keep dirt out of the vital working parts of your equipment. And just to give you an idea of the magnification in this view, the dark line running vertically through the "after" picture is a human hair (.0025" dia.)!

Carefully controlled tests under operating conditions show that Nugent Absorbent Filters will get 99.8% of the dirt! Translated into benefits for you this means longer life and less maintenance for your equipment and substantial savings in oil.

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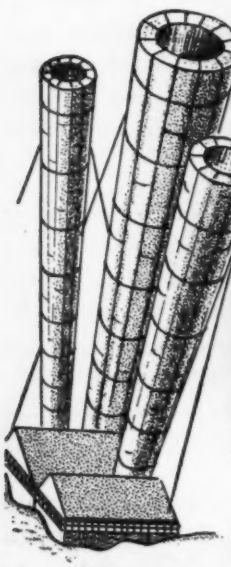

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TO ACIDS, ALKALIES AND DECAY

Tidewater
RED CYPRESS

Tidewater Red Cypress serves better and lasts longer. It's natural resistance to acids, alkalies, etc. insures long and satisfactory results when used in vent stacks, pickling troughs, electroplating vats, etc. It's use under these conditions truly confirms its claim to being "The Wood Eternal".

If you have a particularly perplexing problem let us help you solve it. We invite inquiries concerning all types of tanks and vats . . . fully fabricated or partially fabricated.

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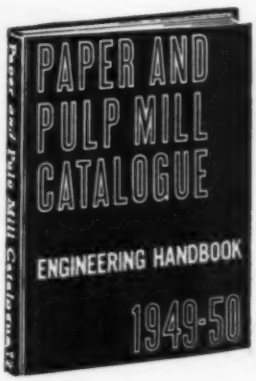

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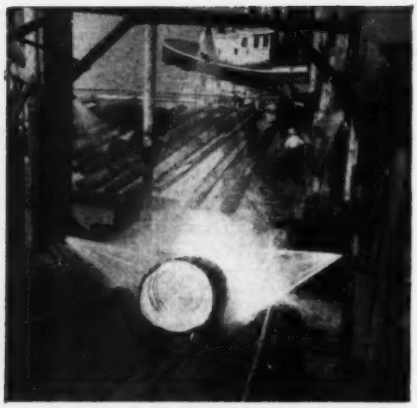


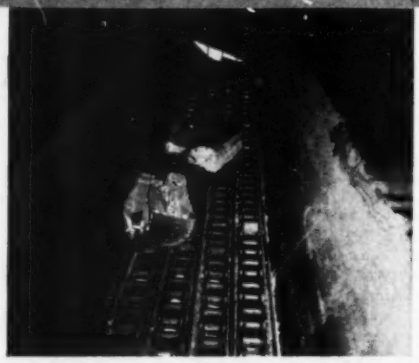
On the log haul, Rex Log Haul and Conveyor Chains keep a steady flow of logs into the mill.

. . . REX PULP MILL CHAINS

The wood handling system is truly the "life line" of the mill. That's why so many mills have standardized on the Rex Line of Standard Pulp Mill Chains. No worries about premature chain failures to break the "life line" . . . hold up production . . . step up costs, with these husky chains on the job. They're built and designed to add life to any wood handling system . . . to keep going under loads and service conditions where ordinary chains would quickly fail.

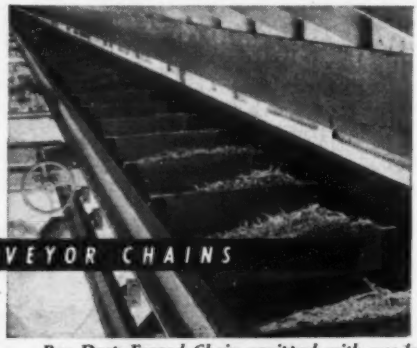
Whether they're steel or malleable, all Rex Chains are precision-built of the finest materials . . . assembled by the most modern manufacturing methods. Modern assembly line production methods assure product quality and uniformity . . . permit closer inspection and testing.

Right through your mill, you'll benefit by standardizing on the "life line" . . . Rex Pulp Mill Chains. For all the facts, send for your copy of Bulletin 48-27. Call your local Rex Field Office or write Chain Belt Company, 1714 West Bruce Street, Milwaukee 4, Wis.



From splitter to barking drum, Rex Combination Chain, a big favorite in pulp mills, furnishes the moving power.

In a West Coast mill, Rex H-Type Chain carries logs to the debarker. Logs are stored on the chain to eliminate rehandling.

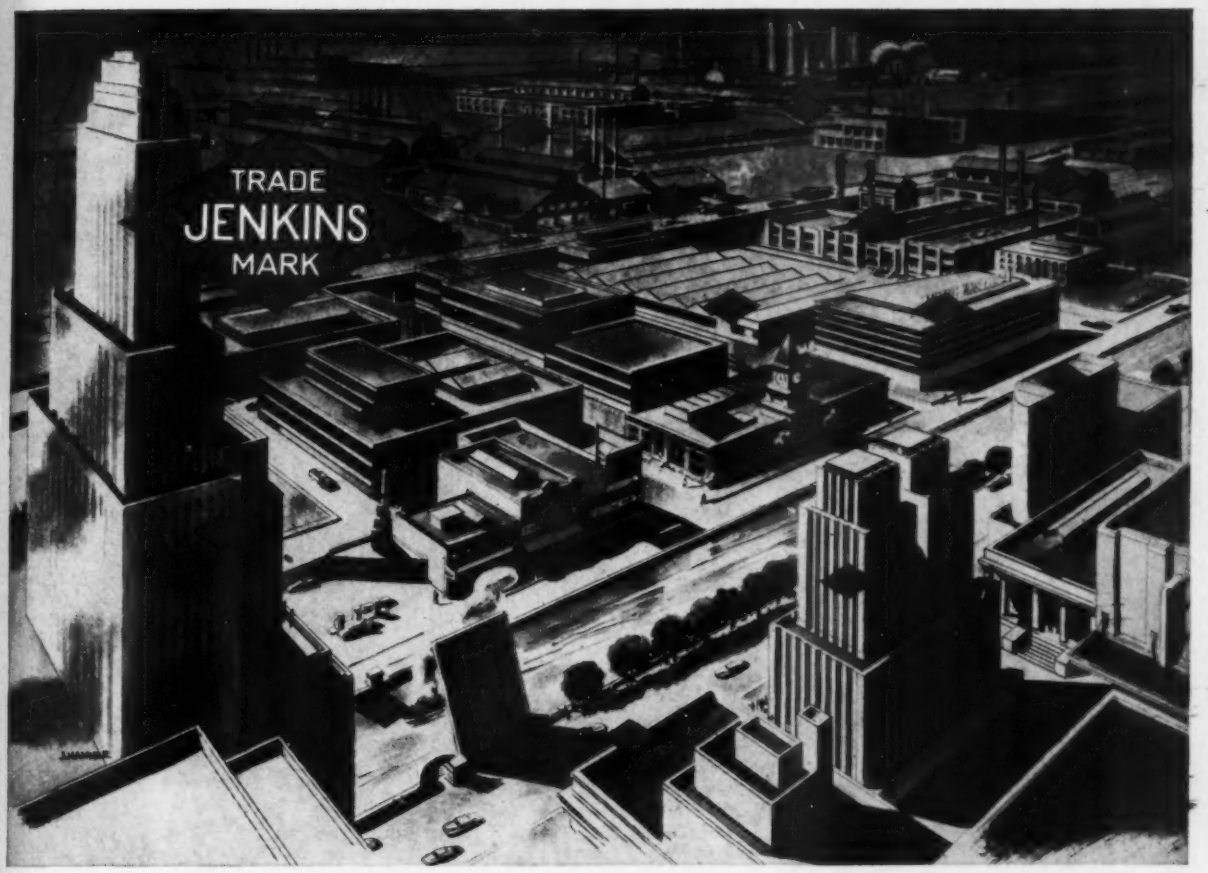


Rex Drop Forged Chain equipped with wooden flights carries bogged fuel for the boilers. Discharge is through the return run of the conveyor. Note the adjustable chutes.

CHAIN BELT COMPANY REX DRIVE AND CONVEYOR CHAINS

FIRST For LASTING Service

Now available from stock



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SINCE 1864
TRADE JENKINS MARK

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(with Wire Braid Tube!)

BREAKS ALL PERFORMANCE RECORDS!

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